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THE

DENTAL COSMOS:

A

MONTHLY RECORD OF DENTAL SCIENCE.

Devoted to the Interests of the Profession.

EDITED BY

EDWARD C. KIRK, D.D.S., Sc.D.

Observe — Compare — Reflect — Record.

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THE

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ORIGINAL COMMUNICATIONS.

SOME USES OF THE ROENTGEN RAYS IN STUDIES OF THE INTERNAL ANATOMY OF THE FACE.

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(Read before Section I, Fourth International Dental Congress, St. Louis, Mo., August 31, 1904.)

THE study of applied or surgical anatomy by the method of sectionizing the head and face has demonstrated that the internal anatomy of the face is not the same in different subjects; that, in fact, in the same individual the two sides of the face often vary markedly. The knowledge thus gained has been of the most practical importance to the surgeon, whether in the special fields of rhinology, ophthalmology, or stomatology. It is, however, often desirable to make a study of the internal anatomy of the face and of the movements of the mandible in the living subject. The pneumatic sinuses and cells vary so much in their shapes, sizes, and outlets that it is impossible to get a definite knowledge of them in a given living subject, or by studying them from sections alone, and it is often important to know the density of living bone and the position of the various structures before undertaking a surgical operation.

During the last decade the employment of the Roentgen ray has come into general use in various ways in both the medical and dental professions. Its most important service has been in the localization of foreign substances, pathological deposits, fractures and dislocation of bones, the over-calcification of bone, and other pathological conditions, the treatment of various diseases, etc. It has also been employed to a slight extent in the study of normal anatomy. It is along this line of work that your writer wishes to speak particularly.

The movement of the condyloid process within the glenoid fossa and its relation to the eminentia articularis at the various stages of the advancement of the mandible and the different degrees of opening of the mouth can be studied fairly well by the ordinary X ray, but when we reach the pneumatic sinuses and cells of the face it is necessary to use the more advanced radiograms. Those

who have worked with so much energy upon this line of investigation are entitled to the greatest credit for the fine results obtained.

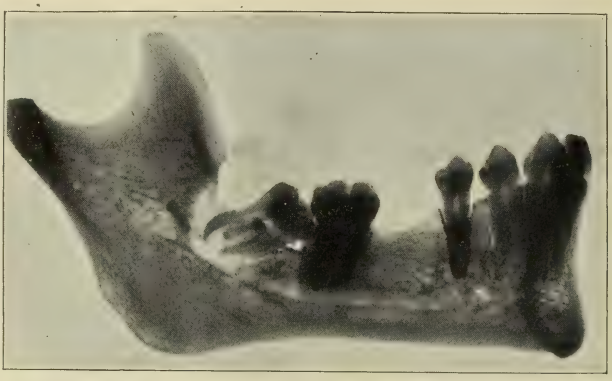
ORDINARY AND "STEREOSCOPIC" RADIOGRAMS.

During a visit of the writer to Dublin in the summer of 1903 he had the pleasure of seeing stereoscopic work of this character done by Dr. Wm. S. Haughton. Not until that time had he thought it practicable to make stereoscopic X-ray pictures of the living subject for the purpose of studying the internal anatomy of the face.

Immediately on his return the writer consulted his colleague, Dr. Kassabian of the Philadelphia Hospital, and under his instructions and with funds supplied by the dental department of that institution, a complete apparatus was constructed for making stereoscopic X-ray pictures of any portion of the body. Experiments were first made with the cleaned skull, with fairly good results. Then plates were made from the living subject, but, on account of the density of the tissues of the head and face, the time of exposure necessary was considerably longer than is required for other portions of the body, which made it difficult for the patient to keep perfectly still during and between the two exposures.

Even by studying dried bones with the ordinary X-ray pictures, many interesting facts can be shown. For instance, a good picture was made of one-half of a cleaned or dried mandible showing the general outline of the bone. (Fig. 1.) The variations in density are seen, with the cancellated tissue situated between the cortical portions of the bone; the positions and shapes of the roots of the teeth, with the nerve canals, are plainly shown, and the inferior dental tube may also be seen. The picture also shows an impacted lower third molar. A *stereoscopic* picture of this character may be made and examined through the stereoscope, when the internal anatomy can be better seen and studied.

FIG. 1.



PATHOLOGICAL CONDITIONS.

Fig. 2, a picture of the upper and lower jaws, is from a patient of Dr. Dray of Philadelphia, to whom I am indebted for this illustration. In the lower jaw the dental tube is shown extending nearly the entire length of the bone. The roots of the premolars, the two roots of the first molar, and the anterior root of the second molar are clearly seen, but the distal root is covered by the crown of an impacted third molar. In the region of the impacted tooth there is a cloudiness which indicates that an inflamed condition exists, not only in the bone but also in the surrounding tissue. This is of vital surgical importance; for instance, in this case the patient was suffering from neuralgia at the time the picture was taken, and gave strong clinical evidence of the inflammatory condition in this region, which was caused by the impacted lower third molar resting against the distal root of the second molar. The absorption of the tissue of the root of the second molar proceeded until the pulp was exposed, thus causing the inflammatory condition noted. Upon the extraction of the second molar both the inflammation and the neuralgia subsided.

MOVEMENTS OF THE MANDIBLE.

By means of numerous X-ray pictures of the mandible, taken with the teeth in normal occlusion, with the mouth open, and in various positions between these two, it has been seen that the head of the condyle changed from one position to another. When the teeth were in occlusion, or nearly so, the condyle rested in the anterior portion of the glenoid fossa, as seen in Fig. 2. When the mouth was slightly opened the condyle was seen to be lowered slightly, resting against the articular eminence. When the mouth was forced wide open the condyle was immediately under and resting against the eminentia articularis. In a few cases it was found slightly in advance of the eminence. In all cases examined where the mouth was only slightly opened, the angle of the jaw moved slightly downward and backward.

MECHANISM OF THE TEMPORO-MAXILLARY ARTICULATION.

If the mechanism of the anatomy of the articulation of the lower jaw be carefully examined, it will be found that the internal, external, and stylo-mandibular ligaments act as suspensories to the jaw, and have a tendency to fix the angle of the mandible when it is carried slightly downward and backward—as when the mouth is partially opened. The muscular fibers of the internal pterygoid and the external portion of the masseter muscles have the same tendency. The condyloid process of the mandible acts as the fulcrum or pivotal point of the bone. The point or fulcrum moves forward with its cushion, the interarticulating fibro-cartilage, mainly through the action of the external pterygoid. While the jaw is being carried forward the mouth can be opened slightly, still retaining

FIG. 2.



the fulcrum or pivotal point at the end of the condyle, but as the mouth is opened wider the fulcrum is gradually changed from the condyle toward a more central portion of the ramus and then toward the gonion, the angle probably eventually becoming the fulcral point through

open. It is thus that the external pterygoid becomes an opener of the mouth.

The reason for the change of fulcrum or pivotal point may be found in the condition which obtains in the pharyngeal region. If in opening the mouth wide the head of the condyle acted within the

Fig. 3.



the partial fixation of the ligaments and muscles before referred to. By the action of the external pterygoid muscle the condyle is drawn forward and the mouth is thrown wide open, with the condyle under or slightly in advance of the eminentia articularis, as is shown in radiograms taken when the mouth was wide

glenoid fossa as the only pivotal point, the lower portion of the ramus, with the body of the bone, the hyoid bone, the base of the tongue, and other associated tissues would be carried backward until the soft tissue coming against the post-pharyngeal wall would interfere with the functions of that region. By the transfer

of the pivotal point this possibility is avoided.

Fig. 3 was made from an X-ray picture taken while the mouth was wide open. It shows that the condyle has been carried well forward with its upper surface resting immediately under the eminentia articularis. This illustration shows other interesting points. The distal border of the ramus is anterior to the line of the vertebræ, which is the normal position even when the mouth is wide open, as was also shown in Fig. 2. This point will be referred to again.

In nearly all radiograms of the face it is noticeable that the roots of the teeth extend no higher than the line of the roof of the mouth. We have here an example of this. No roots are visible above the dark line found above the teeth, which is the roof of the mouth proper. All the tissues below this line belong to the alveolar process and are resorbed in old age, provided the teeth have been lost. The two circular lines seen in the upper jaws are portions of the walls of the maxillary sinuses.

Fig. 4.



Fig. 5.



IMPACTED TEETH.

In the lower jaw, the two lower third molars are shown to be impacted. They were extracted, and Fig. 4 gives the views of the left molar after extraction.

Fig. 6.



Fig. 5 is from another radiogram showing the position of the point of the condyle when the mouth is wide open.

In Fig. 6 the dark line indicating the roof of the mouth may be seen above all the roots of the upper teeth except the upper third molar. This tooth has been impacted, and having become incarcerated near its place of development has not descended to the line of occlusion. Through its interference with branches of the nerves passing in this region it caused otalgia and other facial disturbances. After extraction of the tooth the trouble ceased. The light space above the dark line shows the position of the maxillary sinus and nasal fossa.

Fig. 7.

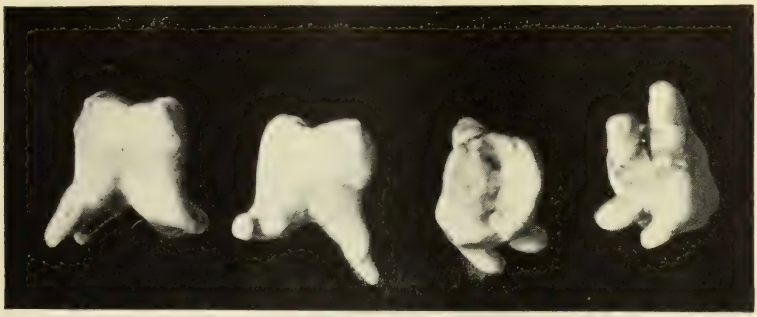


Fig. 7 gives four views of the extracted impacted tooth visible in Fig. 6.

Fig. 8 is from a radiogram of a living subject. It shows very plainly the developing lower third molar with its capsule, a retarded or unerupted second premolar, also the canal or tube passing downward and forward in the ramus. The second molar apparently has four

Fig. 8.



roots; the second premolar seems to have two roots, but this is not the case, the appearance being caused by the incompletely developed apices of the roots. This radiogram was very useful in studying the best method for correcting the malposition of the anterior teeth.

STEREOSCOPIC RADIOGRAMS.

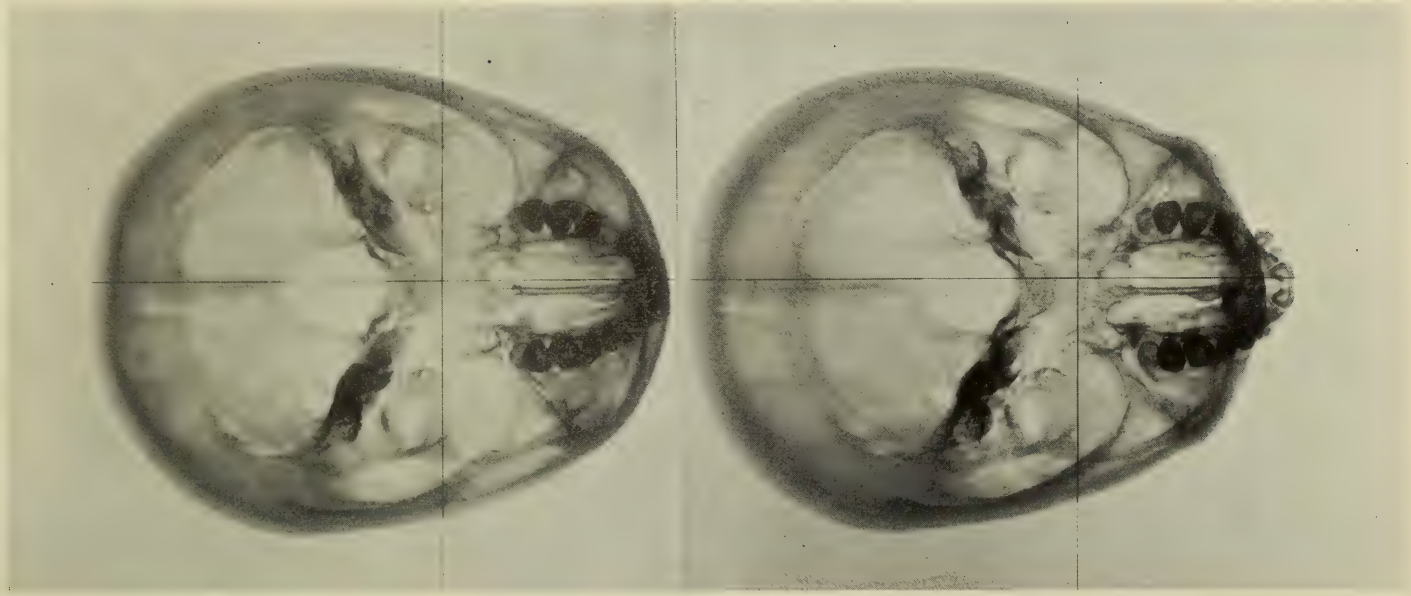
Fig. 11 shows half of a stereoscopic radiogram of a lateral view of a skull. It was made by Dr. William S. Haughton of Dublin. In order to appreciate the true value of this picture it must be seen with its mate through a large reflecting stereoscope. Unfortunately such pictures cannot be observed conveniently upon the screen, therefore you are invited at your leisure to examine this and other radiograms with the stereoscope. Seen in this manner the skull stands out in bold relief, indicating the teeth and their pulp-cavities with their relative positions as they are held in the alveolar process. The upper third molars have been impacted and are resting on a line with the roof of the mouth. There is also an impacted upper premolar resting above the second premolar.

In an ordinary single X-ray picture it would be impossible to localize the true position of these teeth. A stereoscopic radiogram gives a very much better idea; two stereoscopic pictures taken at right angles with each other will locate correctly, especially if the stereographs are as well done as in this case. Unfortunately such a right-angle picture could not be taken of a living subject. The region of the maxillary sinuses is beautifully shown, and their respective walls can be outlined. The inner walls of the orbits, with the ethmoid cells resting between them, can be distinctly seen. The frontal sinuses are well shown, also the floor of the anterior fossa of the brain-case. In examining the center of the skull the right external auditory meatus is the nearest object. In looking through the squamous portion of the temporal bone the upper part of the petrous portion of the same bone is well defined. Looking through the skull to the opposite side of the brain-case the grooves for the meningeal arteries and the sutures of the brain-case are seen, and, near the base of the ridges, the petrous portion of the temporal bone of the opposite side. The density of the right petrous portion cuts off part of the view of the left internal auditory meatus. At the back of the petrous portion a deep groove is seen for the passage of the lateral sinus. Pages might be written describing what might be seen in this illustration.

Fig. 9 is a vertical stereoscopic radiogram by Dr. Haughton, taken through the base of the same skull as Fig. 11. It is taken at right angles to the other picture. The occluding surfaces of the teeth are shown, also the two impacted upper third molars in line with the other teeth, and the impacted upper premolar is seen to be in a line with the second premolar. By comparing this figure with the last illustration the teeth can be located for all practical purposes. Two pictures taken at right angles to each other, when studied together, will indicate pretty accurately the correct position of any foreign body or impacted teeth. (Figs. 9 and 11 illustrate this point well in regard to the impacted upper teeth.) Along the center of the roof of the mouth are two lines showing the two plates forming the vomer and the other portions of the septum of the nose. There is a slight deviation of the septum opposite the space between the second premolars and the molars. The turbinated bones are seen through the roof of the mouth. Passing to the outside of the teeth and looking through the bone at the base of the malar bones and through the tissue surrounding the teeth, the maxillary sinus can be well defined. In passing back of the facial bones the internal structures of the body of the sphenoid bone, the basilar process of the occipital bone, and the petrous portion of the temporal bone can be studied.

Fig. 10 is from the same radiogram as Fig. 9, with the position of the halves changed. That originally on the right

FIG. 9.



Stereoscopic radiogram. Vertical view from base of skull. (Examine with ordinary prism stereoscope.)



Fig. 10.

Stereoscopic radiogram. Vertical view from vertex.

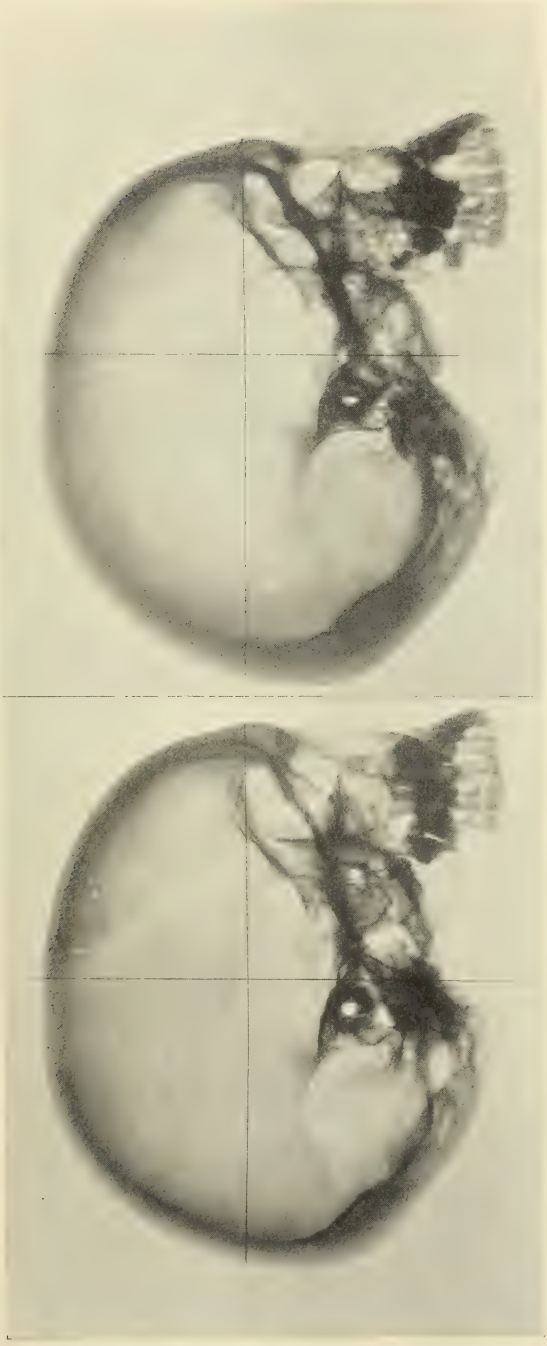


FIG. 11.

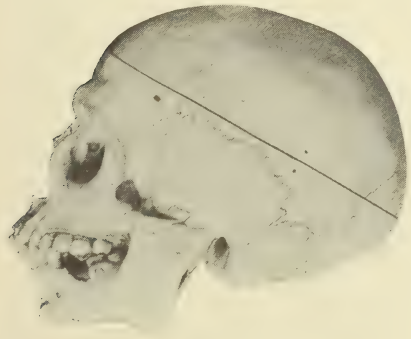
Stereoscopic radiogram. Side view.

side is placed on the left one, and that which occupied the left side is here on the right side. It shows the floor of the three fossæ of the brain-case. The floor of the anterior fossa is somewhat indistinct on account of its thinness, which allowed the X ray to pass through it; but in so doing it reveals the ethmoid cells and the sphenoidal sinuses. The lesser wings of the sphenoid are seen posteriorly, also the petrous portion of the temporal bone. The mastoid cells are likewise visible.

CASE SHOWING THE VALUE OF X-RAY WORK.

The illustrations following will show the value of the radiogram in investigating. The case is that of a young man now nineteen years old, who fell off a

FIG. 12.



banister when sliding down, at the age of four years, and injured the temporomandibular articulation, causing ankylosis of the joint. At ten years of age a double operation was performed for removing the condyloid process for the relief of the ankylosis, resulting in a slight improvement for a short time.

We have in this case a typical example of what the writer referred to in 1898 in describing the effect of permanent ankylosis on the bones affected; that is, that "the abnormal application of forces to the developing bone results in the development of an abnormal form." There is no question that in this case we have the typical abnormal bone as shown in Fig. 12.

Fig. 13 is from a photograph showing a profile view of the patient. Fig. 14 is a front view. Fig. 15 is a view showing the muscles of the anterior portion of the neck in an endeavor to open the mouth. Fig. 16 gives the lateral muscles of the neck during the same effort. The physiological action of these muscles can be studied from these last two pictures. Naturally the anatomist and surgeon would be anxious to know something about the changes that have taken place in the internal anatomy through the muscular action. With this idea in view two X-ray pictures were made, one from each side.

Fig. 17 is from a radiogram taken by Dr. Kassabian. It is made from the right side of the face, and shows that the mandible has changed completely, taking on the character of a typical ankylosed jaw; this process was demonstrated eight years ago, when the writer gave several illustrations demonstrating this point. This and other cases have confirmed the description and the cause as then given. The mental process is drawn back and the gonion downward. In this case the ramus is drawn back beyond a line parallel with the anterior portion of the vertebra. This may be partly due to the removal of the condyloid process in the surgical operation referred to. Through the loss of this process, with the action of the external pterygoid muscle, there is but little to prevent the whole bone from being forced backward, and when it goes back, the hyoid bone, the tongue, and all the tissues associated with it must move backward nearly to or against the postpharyngeal wall.

The picture also shows that the upper and lower third molars are impacted.

The shape and position of this side of the mandible are similar to those of the left side, although the teeth differ somewhat in their position in the lower jaw. The lower second molar is tilted forward, while the third is impacted. The dark line to be observed above the teeth in the illustration (Fig. 17) is the roof of the mouth seen edgewise, which makes it

look dense. Above this dark line are the maxillary sinuses. The dark line over this is in part the floor of the orbits, above which, again, is the region of the ethmoid cells. The roof of the orbits is outlined, and above that again the frontal sinuses are clearly seen, showing a partial septum between them. From this picture alone it would not do to claim that there is no septum, as it is possible that it is there and, it being thin, the rays have passed through it. Until lately the writer was of the opinion that there was always a septum between the two frontal sinuses, but he has now in his possession two specimens without septa.

Fig. 13.

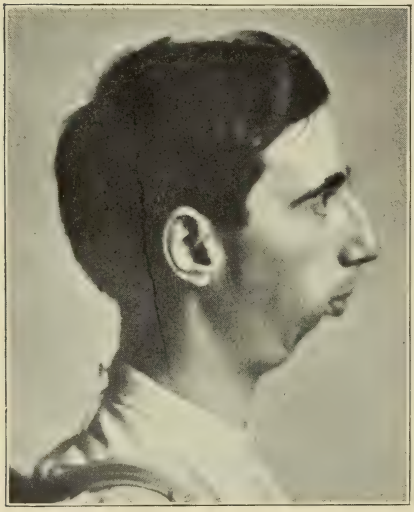


Fig. 14.



Fig. 15.

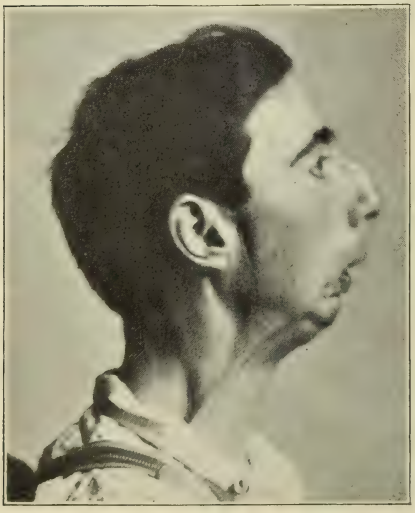


Fig. 16.



Radiographic pictures of dried skulls when shown by the stereoscope are all that can be asked for. But the surgeon will not be satisfied until the radiographer produces as good pictures from the living subject as those from the dried skulls. Sectionizing and the stereoscopic pictures have proved that no two skulls are alike in regard to the roots of the teeth, their shape or position. The pneumatic sinuses and cells also differ greatly; therefore, when trouble exists in these regions and the surgeon is about to operate he is anxious to know the special anatomy of the part to be operated upon, as a correct diagnosis is difficult without it. At such times the value of the X ray may be inestimable if the radiogram can be so perfected as to show density, shape, size, etc., in all their relations to the living subject. The writer is of the opinion that this knowledge will be obtained through the use of the stereoscopic radiogram. Those who are investigating along this line of work have accomplished a great deal during the past eight years, since the discovery of the penetrating powers of the X ray, but it is improbable that they have yet attained the limit.

FIG. 17.



A STUDY OF CERTAIN QUESTIONS RELATING TO THE PATHOLOGY OF THE TEETH.

By W. D. MILLER, M.D., D.D.S., Ph.D., Sc.D., Berlin, Ger.

(Read before the Section on Etiology, Pathology, and Bacteriology of the Fourth International Dental Congress, at St. Louis, Mo., August 31, 1904.)

[AWARDED THE GOLD MEDAL BY COMMITTEE ON PRIZE ESSAYS.]

(Continued from vol. xlvi, page 1001.)

(II.)

RESISTANCE OF ENAMEL IN DECIDUOUS AND IN "SOFT" AND "HARD" TEETH.

EXPERIMENTS regarding the susceptibility of different teeth to caries would be very incomplete if only the dentin received consideration. The enamel offers a resistance to destructive agents, of whatever character, far greater than that of the dentin, and the protection which it affords to the teeth is of the greatest importance. This is plainly illustrated by Fig. 17, a photograph of a tooth which had been exposed for months to the action of very weak acids.

I wish here to refer first to a number of points brought to light by my investigations which are of considerable importance in helping us to a thorough understanding of the phenomena of dental caries.

In the first place I beg to emphasize the fact that in caries of the teeth the chemical destruction of the enamel takes place to a very great extent from within outward, and is very materially assisted by mechanical agents.

Typical cases illustrating this fact are shown in Figs. 18 and 19: slight action on external surface; penetration of the acid through a comparatively narrow channel into which food may be forced in the process of mastication; undermining and comparatively extensive action upon the internal surface, and, finally, breaking down of the enamel bridge by mechanical action.

Figs. 20 and 21 show the same features on the approximal surface and at the neck of the tooth.

The external intact smooth enamel surface offers a most stubborn resistance to the action of weak acids and far greater resistance than the internal surface. (Figs. 22 and 23.)

Fig. 23 shows a section of a hard tooth which had been ground down to expose the dentin and suspended in solution No. 1 for one year and nine months, the solution being repeatedly changed. The enamel externally where completely intact shows but slight disintegration, whereas the entire core of dentin had become decalcified as well as a considerable portion of the inner enamel surface.

Abrasions, bruises, cracks, or any other defects, natural or artificial, very sensibly diminish this resistance. This point is illustrated by Fig. 24, showing the effect of a bruise of the enamel surface caused by the forceps in extracting.

The resistance of the enamel appears to be due in part to the protective action of the enamel cuticle. Fig. 25 illustrates this. Here I have reproduced a section of a tooth which had been exposed to solution No. 1 for nine and a half months. It attracted my attention in particular because it showed a zone about 2 mm. broad which did not appear to have been

affected in the least, while the rest of the surface was white and chalky. On subjecting this tooth to the action of a 5 per cent. solution of hydrochloric acid I found that the zone mentioned was still covered by the enamel cuticle, which was wanting on the other parts. This as well as other observations have led me to the conclusion that the enamel cuticle furnishes a certain protection to the tooth and should not be wantonly destroyed in dental operations.

It is also worthy of notice in this connection that in dental caries the enamel cuticle is not simply lifted up from the surface of the tooth, as it is by hydrochloric or nitric acid. A tooth may remain for months in fermenting solutions and the enamel undergo considerable decalcification without losing the enamel cuticle. Fig. 26 illustrates this fact. This tooth had been suspended for two months in mixture No. 4 and was decalcified to a considerable depth. On exposing a section to a 5 per cent. solution of hydrochloric acid the enamel cuticle was brought to view as seen in the photograph.

The same is true also to a surprising degree in natural caries of the teeth. Subject, for example, a tooth showing a decay mark (caries nigra) to the action of a 2 to 5 per cent. solution of hydrochloric acid, and we find that the enamel cuticle not only makes its appearance on the sound surface but on the margins of the decay mark where considerable decalcification of the enamel has taken place. In the center of those marks the cuticle appears to be glued down to the surface of the enamel, although the caries process may have already reached the dentin. (Figs. 27 and 28.) It adheres tenaciously to the surface of the decayed enamel, and when it finally comes away after prolonged action of the acid it usually carries fragments of the enamel prisms with it. Where there has been a

FIG. 17.



Comparative action of acids on enamel and dentin. Tooth suspended for several weeks in solution No. 1.

loss of substance the cuticle is naturally wanting.

This gluing of the cuticle to the surface of the decay marks may explain the remarkable fact that such marks offer much more resistance to the action of acids than does the healthy enamel.

In Fig. 29 I have reproduced a section of a tooth having a characteristic black spot (decay mark) on the approximal surface. This tooth was kept for two months in solution No. 4 and repeatedly brushed with a tooth-brush. The sound enamel was dissolved away around the decay mark, leaving it standing as seen in Fig. 29 at *a*.

Another property of the enamel was brought to light by my experiments which appears still more important than the behavior of the enamel cuticle. The external surface of the enamel seems to be protected by a thin layer or crust which offers a marked resistance to the action of acids in comparison with the deeper layers. Wherever this crust, which is only a fraction of a millimeter thick, is mechanically removed, the acid at once acts far more rapidly upon the enamel than otherwise. This point is clearly illustrated by Fig. 30.

The same fact is clearly brought out by the action of acids upon sections of enamel cut parallel to the enamel prisms. Here the deeper layers of enamel are eaten away, while the external crust is comparatively untouched and remains standing as a jagged point. (Fig. 31.)

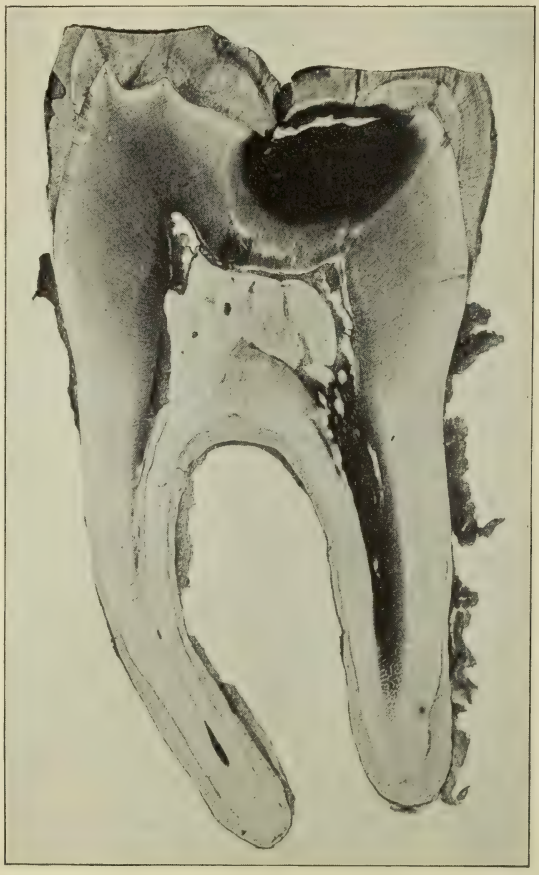
This, then, may in part account for the fact that approximal facets in cases where the outer crust is worn away not infrequently become the starting-point of caries. (Figs. 32 and 33.) In acid mixtures or solutions they are invariably much more affected than is the normal enamel surface.

We recognize here the necessity of preserving this external layer and avoiding unnecessary filing *where the filed surface is not self-cleansing.*

Deep fissures are to be considered as particularly weak points in the enamel armor, and are universally recognized as such. Similarly all defects in the enamel which furnish a lodging-place for food, and likewise cracks and weak lines in the enamel *in all places which lie within the focus of infection,* inasmuch as acid penetrates the enamel more rapidly along such defects. (Fig. 34.)

The argument that defects of structure do not dispose teeth to caries because the enamel of various animals shows such defects and still does not decay is not valid.

Fig. 18.



Undermining caries; destruction of tooth-substance from within.

FIG. 19.



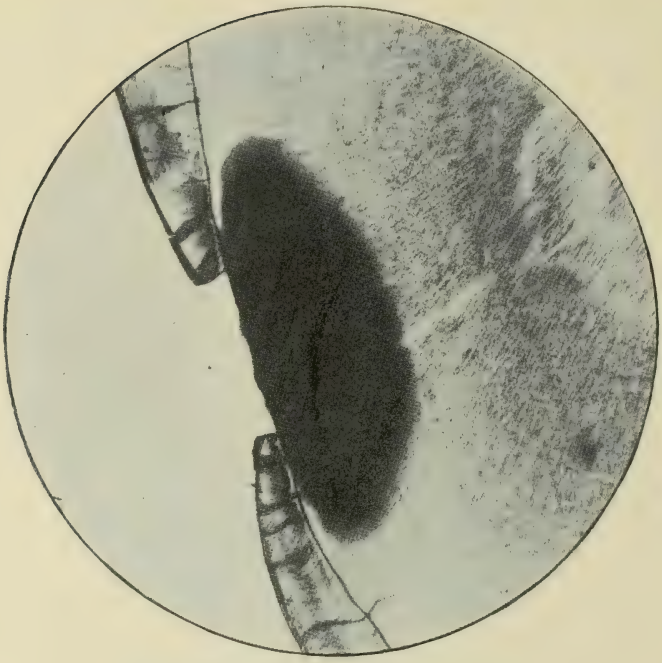
Undermining caries; destruction of tooth-substance from within.

FIG. 20.



Undermining caries of approximal surface; undecayed enamel cusp (*a*) about to break away.

FIG. 21.



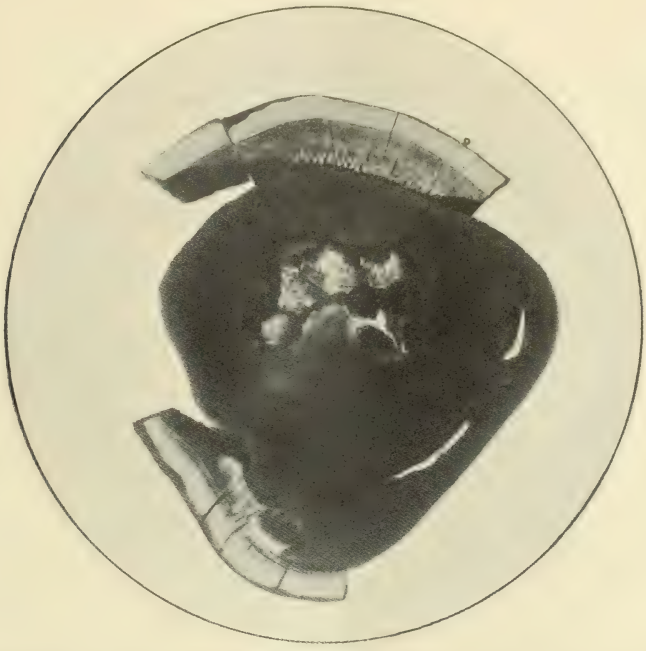
Undermining caries near neck of tooth.

FIG. 22.



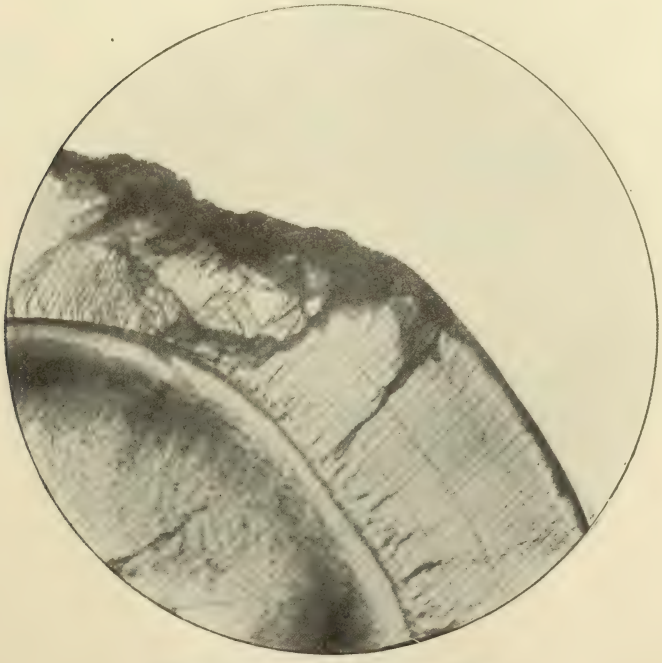
Unequal action of acid upon internal (*a*) and external (*b*) surfaces.

FIG. 23.



Marked resistance of external surface of enamel compared with the total decalcification of dentin and breaking away of enamel walls from within.

FIG. 24.



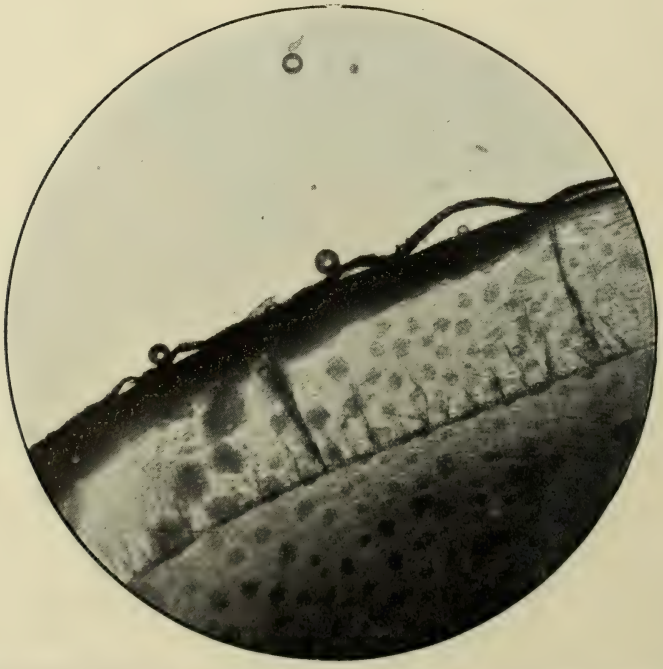
Action of acid upon bruised surface.

FIG. 25.



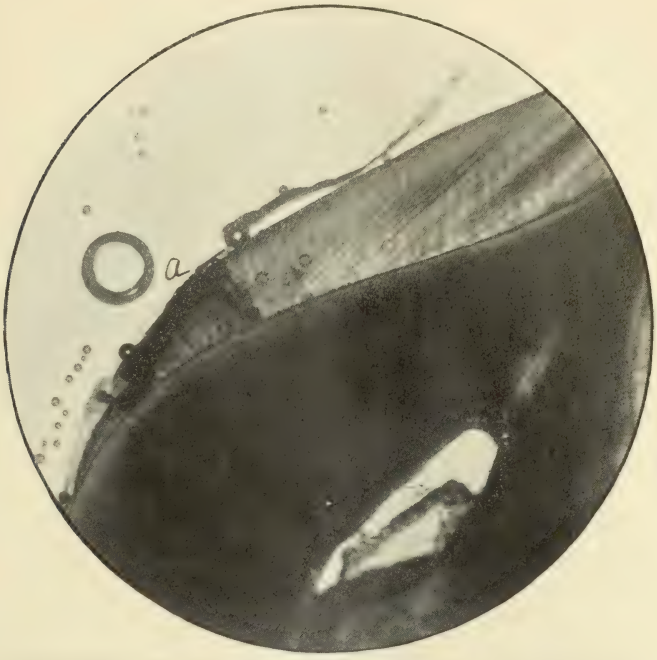
Protective action of enamel cuticle (at *a*).

FIG. 26.



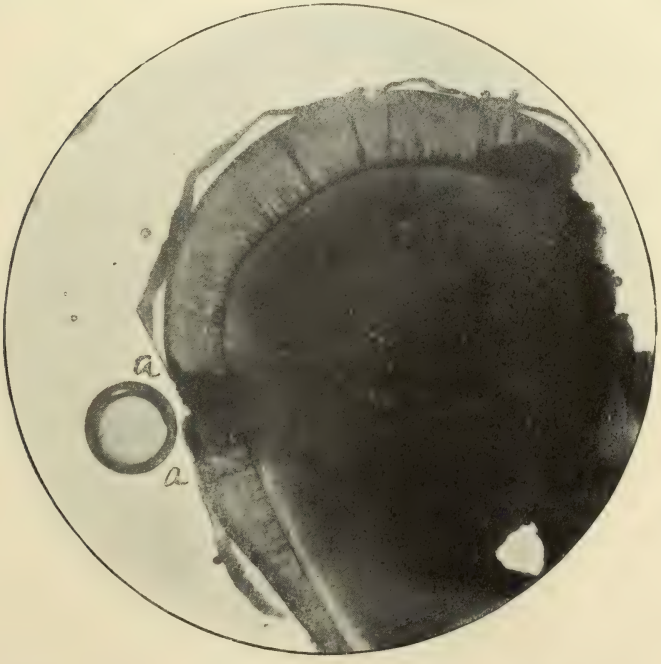
Thickened enamel cuticle on tooth kept for two months in a bread-saliva mixture and decalcified to a considerable extent.

FIG. 27.



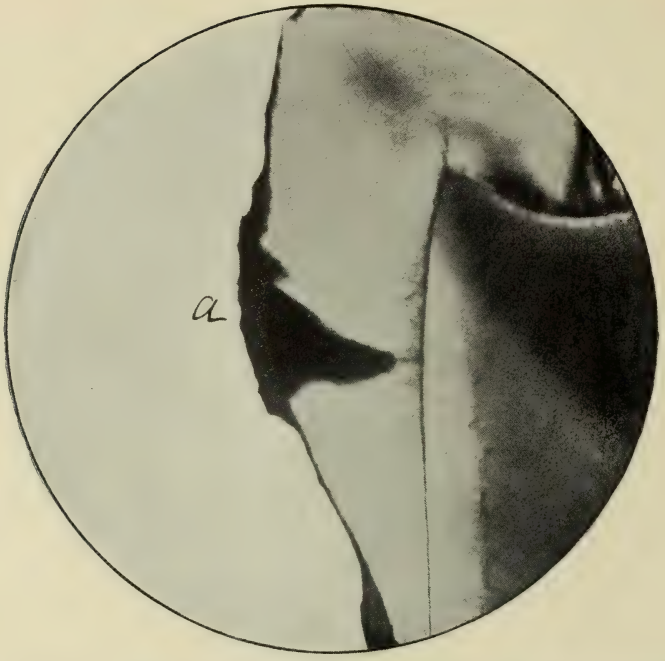
Enamel cuticle under the action of hydrochloric acid still adherent to decayed surface (at *a*).

FIG. 28.



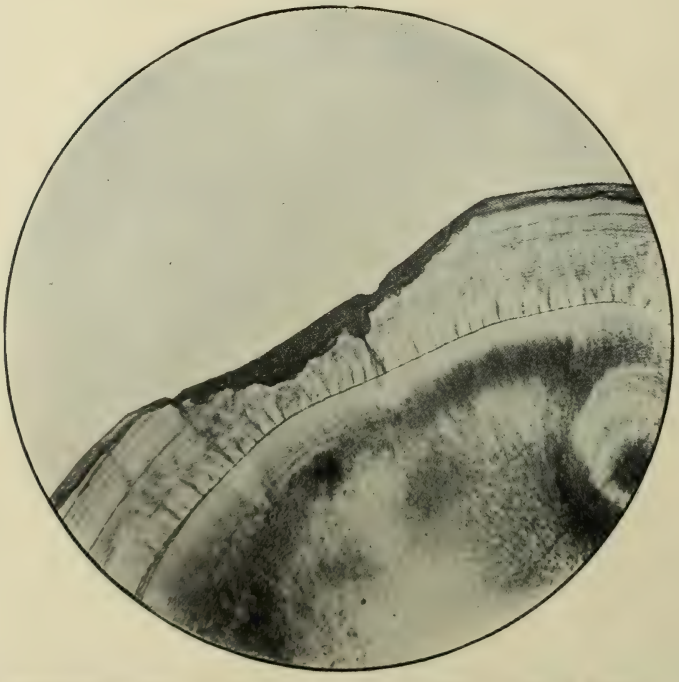
Enamel cuticle under the action of hydrochloric acid still adherent to decayed surface (at *a*, *a*).

FIG. 29.



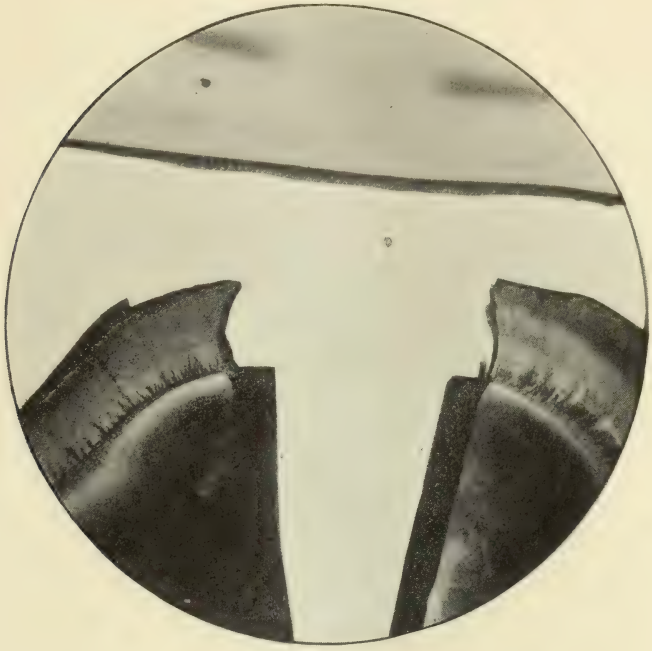
Decay mark (*a*) resists action of acid and brush more than does sound enamel.

FIG. 30.



Increased action of acid due to loss of external layer of enamel.

FIG. 31.



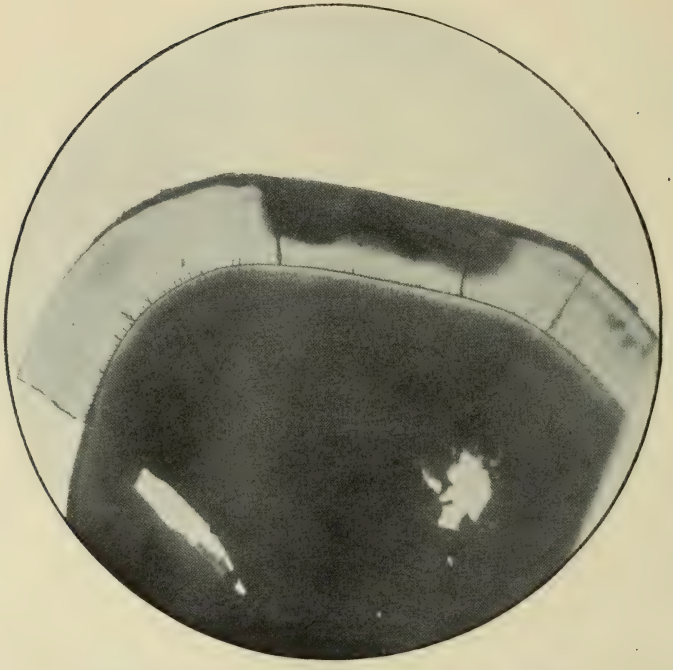
Superior resistance of external enamel crust. In the left piece both enamel and dentin have suffered more than in the right. Time, two and one-half months.

FIG. 32.



Increased susceptibility of approximal facet to decay.

FIG. 33.



Increased susceptibility of approximal facet to decay.

FIG. 34.

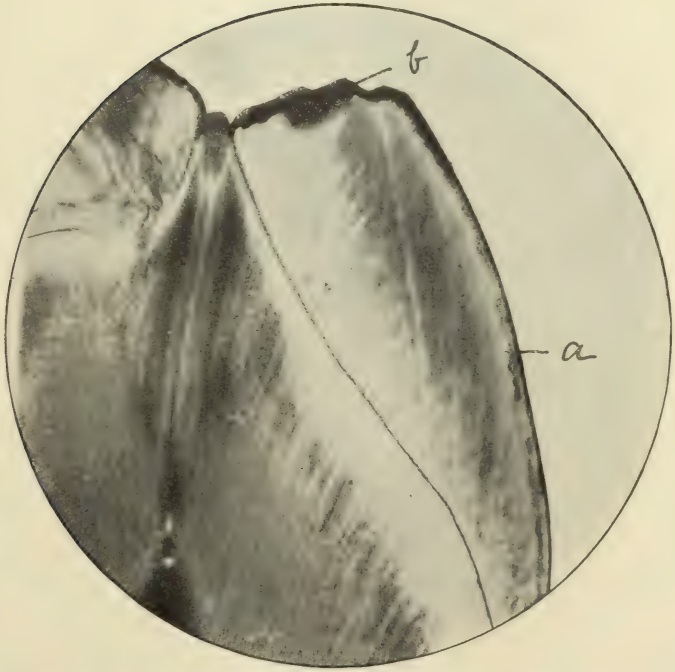


Acid penetrating through weak lines in enamel; undermining caries beginning (at *a*).

FIG. 35.



FIG. 36.



FIGS. 35 AND 36. Fig. 35, a soft not fully developed first molar; Fig. 36, a hard yellowish bicuspid: suspended for three months in the same solution. *a*, Decalcified layer of enamel. Note that the decalcification is several times more extensive in Fig. 35 than in Fig. 36; also that the abraded surface (*b*) in Fig. 36 is much more affected than the smooth surface (*a*).

We might as well say that heat has no effect on the inhabitants of Greenland because no Eskimo as long as he stayed at home was ever known to suffer from sunstroke. Naturally a defective tooth will not decay in the mouth of an animal which does not suffer from caries: no more will it if we put it away in a box. The teeth of many animals have deep fissures and still do not decay, but we should be allowing ourselves to be led astray were we to conclude from this that in the human mouth such fissures do not predispose the tooth to decay.

Whenever any tooth or any surface of a tooth is subjected to influences which produce caries, then weak points in that tooth, whether in the form of fissures, cracks, abrasions, or faulty development, will favor the attacking agents and accelerate the progress of decay.

The conclusions drawn from my experiments are supported by the facts of daily observations in practice and are illustrated by the foregoing photographic reproductions.

The question whether the sound enamel of the teeth of different persons, or of different teeth of the same person, shows different degrees of resistance to the action of acids was made the subject of a large number of experiments, in which the action of fermenting solutions as well as of mixtures of saliva and foodstuffs upon the enamel of deciduous teeth and of so-called hard and soft teeth was determined. The separate experiments extended over a period varying from a few days to one year and nine months, and a few of the results are given in the accompanying photographs.

The results of those experiments leave little room for doubt that the enamel of the teeth of different persons, as well as of different teeth of the same person and of different parts of the same teeth, does show differences in resistance to the action of acids; likewise the thickness of the enamel cap as exemplified in Fig. 40, as well as the integrity of the enamel surface, freedom from fissures, bruises, cracks, weak lines of imperfectly calcified prisms, etc., as far as these come within the sphere of infection. Here too, however, we must avoid exaggeration. My experiments have led me gradually to the conclusion that there is no one all-predominating factor which accounts for immunity or susceptibility to caries, but a large number of factors, part of which are to be sought for in the teeth themselves and part in their surroundings. So, too, the resistance of the enamel is only one of those factors, and its importance will be found to vary greatly in different cases.

I have occasionally found a tooth which I had classed with the soft variety to offer as much resistance as one which I had pronounced hard, and at present I have a deciduous tooth under experiment which appears to hold its own with the best permanent teeth.

INFLUENCE OF THE VITALITY OF THE TOOTH ON THE PROCESS OF CARIES.

It is a recognized fact that the pulps of teeth suffering from caries in not too acute form very often respond to the irritation conveyed to them through the contents of the dentinal tubules by throwing up a wall of secondary dentin and thus opposing a barrier between the pulps and the advancing disease by which its life and that of the tooth may be considerably prolonged. (Fig. 43.)

It is a disputed question, however, whether any changes of an active nature take place within the substance of the dentin already formed. There are those who insist on the view that the hard tissues of a fully developed tooth are not subjected to nutritive or reactive processes of any nature, and that these tissues comport themselves in a completely passive manner in the process of decay. This is probably the case as far as enamel is concerned, but it is certainly not true in reference to the dentin, as is abundantly proved by the changes of a reactionary nature (increased transparency) so often accompanying caries of teeth with living pulps.

The question here to be considered is whether the appearance of a zone of increased transparency in front of the advancing caries in any way affects the

progress of the disease. It is useless here to appeal to practical experience, because the fulfilment of his task from a therapeutic point of view that he gives little

FIG. 37.

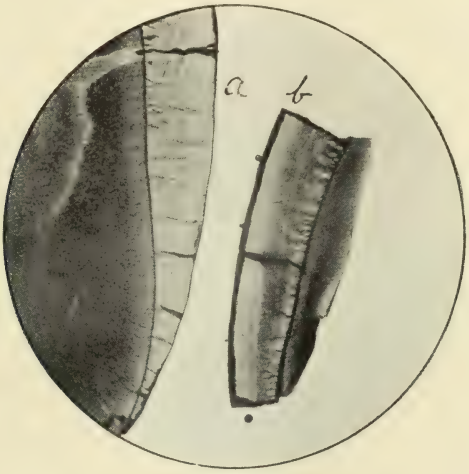
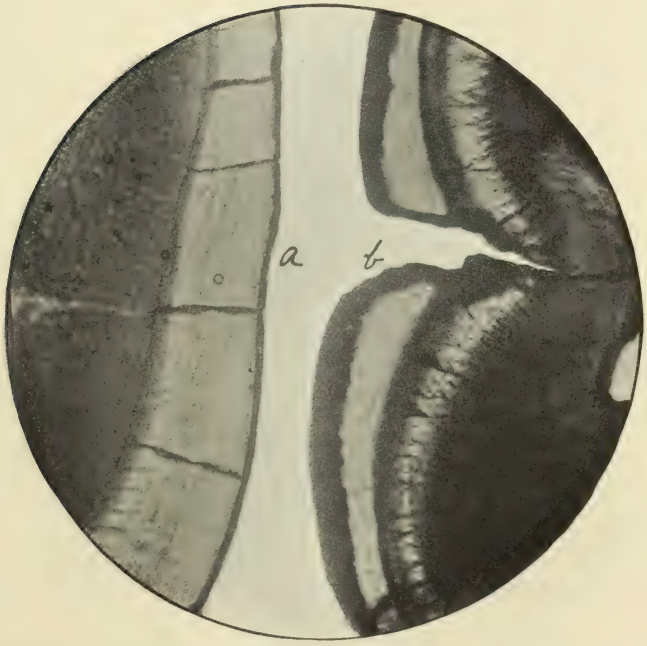


FIG. 38.



FIGS. 37 AND 38. Comparative action on hard enamel (*a*) and soft enamel (*b*). Fig. 37 three months, Fig. 38 ten and one-half months, in solution No. 1.

this has given us only conflicting answers; the truth in the matter being that the practitioner is as a rule so intent on or no attention to the etiology. I am of opinion that the zone of transparent dentin opposes a certain resistance to the

Fig. 39.



Fig. 40.



Figs. 39 and 40. Fig. 39 soft, Fig. 40 hard tooth, eleven months and twenty-six days in solution No. 1. Almost total destruction of enamel of soft tooth. Note also that the thickness of the enamel cap and the absence of a deep fissure are in favor of the hard tooth.

advance of caries over and above that offered by normal dentin. This view receives encouragement from such preparations as that shown in Figs. 44 and 45.

An acid acting upon dentin of equal resistance in all parts advances in a regular line or surface more like that seen in Fig. 45, certainly not as is seen in Fig. 44 at *a*. Here we get the decided impression that the transparent dentin is retarding the process of decalcification. Likewise in Fig. 45, left side, the decay is held back at *a*.

The evidence in these cases, however, not being conclusive, it became necessary to subject the matter to the experimental test.

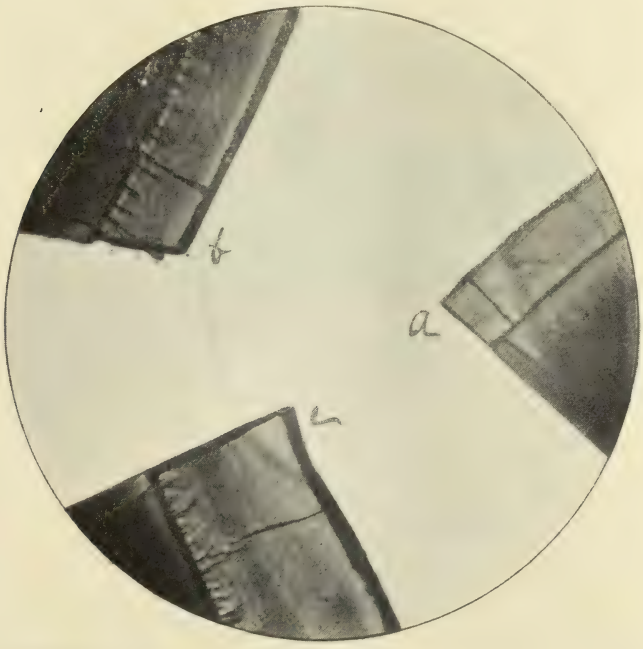
Teeth suited for the purpose were ground down sufficiently to expose transparent zones and were exposed to the fermented solutions. After the lapse of from two to eight days sections were ground, of which a few are reproduced in the photographs Fig. 46-50.

Fig. 51 presents us with a phenomenon which must still receive consideration. Two first molars exhibiting the process of self-healing were ground down from the morsal surface until comparatively normal dentin was reached at *a*, while the parts at *b* were still strongly pigmented. These teeth were suspended in solution No. 1. Sections ground after four days revealed the striking fact that the pigmented dentin, especially in the right piece, had scarcely been affected at all by the acid.

We have here a phenomenon which recalls the similar comparative immunity of decay marks on the enamel to the action of acids. It accords with the observation which I have repeatedly made, that self-healed dentin is but slowly affected by acids.

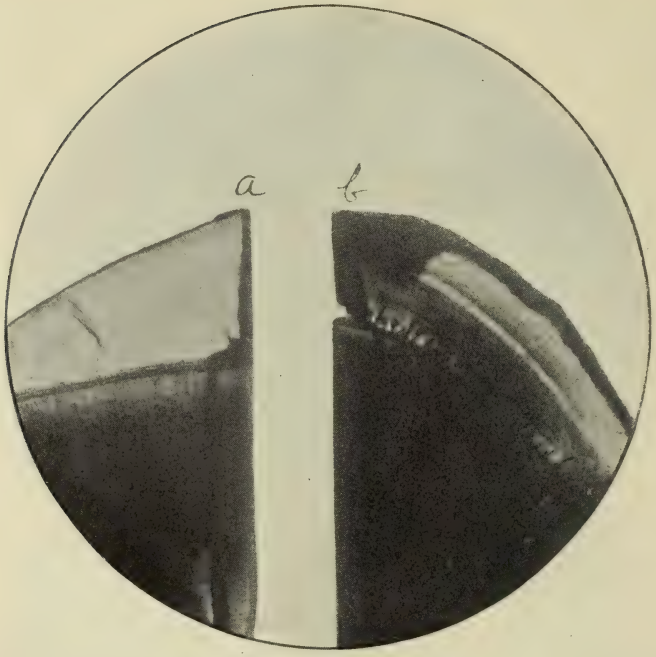
In view of these results I must conclude that the vitality of the tooth as expressed in the production of secondary and of transparent dentin is a factor not to be neglected in our attempts to ac-

Fig. 41.



Comparative action on hard (*a*), soft (*b*), and deciduous (*c*) tooth.

FIG. 42.



Comparative action on enamel of the tooth of an immune (*a*) and the soft first permanent molar (*b*).

FIG. 43.



Deposit of secondary dentin due to chronic caries at the neck of the tooth.

FIG. 44.



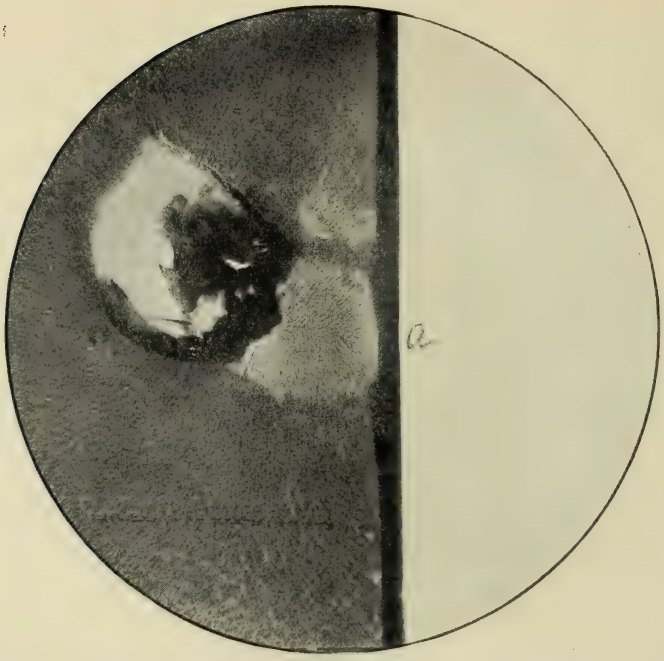
Apparent resistance of transparent dentin to progress of caries (at *a* and *b*).

FIG. 45.



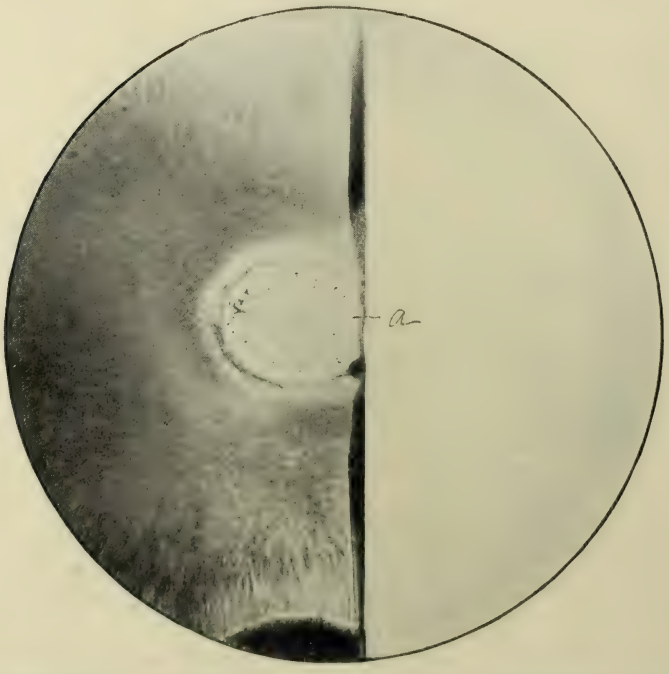
Transparent dentin (at *a*) due to pathological process previous to the present acute caries. It apparently resists the advance of the decalcification.

FIG. 46.



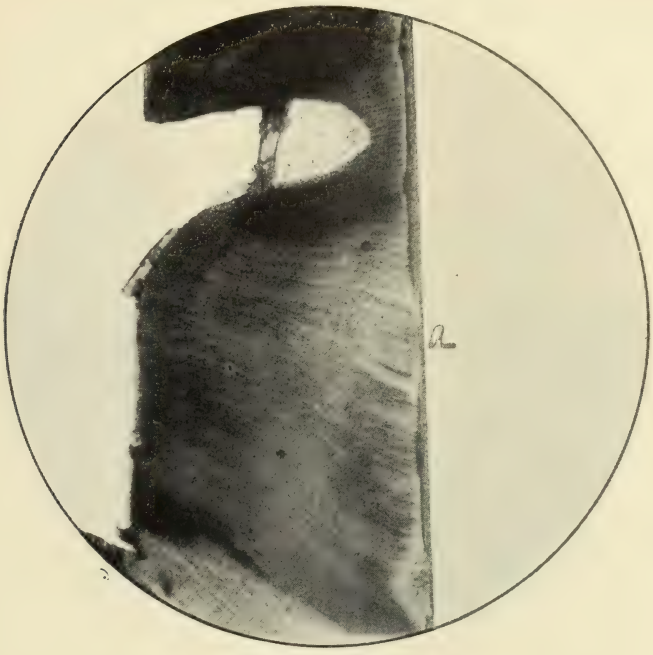
Evident superior resistance of secondary dentin to decalcification (at *a*).

FIG. 47.



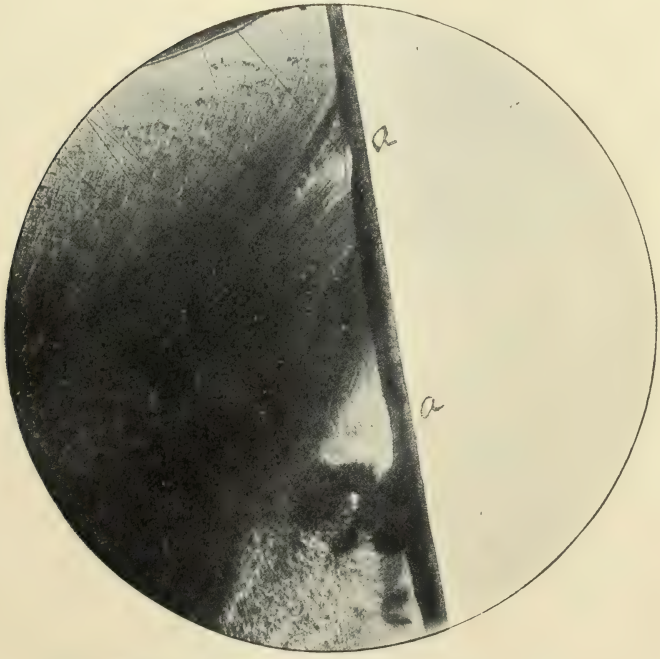
Evident superior resistance of secondary dentin to decalcification (at *a*).

FIG. 48.



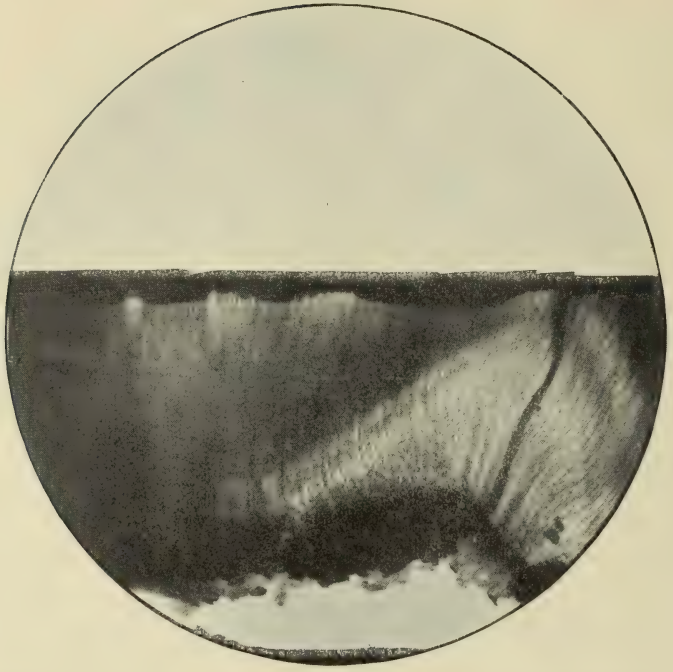
Decalcification retarded by transparent dentin (at *a*).

FIG. 49.



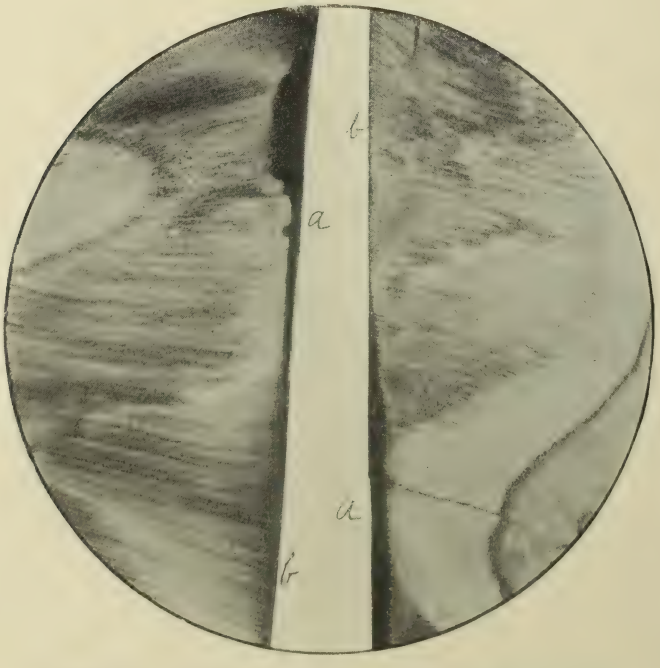
Decalcification retarded by transparent dentin (at *a*, *a*).

FIG. 50.



Striking influence of transparent dentin on process of decalcification.

FIG. 51.



Immunity of self-healed dentin to action of acid (at *b*, *b*).

count for all of the phenomena observed in connection with decay of the teeth. Whether the vitality of the tooth offers any obstruction to the advance of decay over and above that manifested through the agency of secondary and transparent dentin is a problem still to be solved at the expense of much patience and labor.

Evidently certain changes of a nature still to be determined take place in the dentin which make it to a certain extent impermeable by acids. This fact, as well as the fact noted above that decay marks likewise offer an increased resistance to the action of acids, throws out suggestions which we ought to be able to make use of in the prophylactic treatment of the teeth. Undoubtedly there are substances which applied to the teeth would help to bring about or intensify the above changes, and it remains to determine if possible what these substances are. At present only silver nitrate has been employed for this purpose, and with a certain degree of success.

The results of the investigations which have been reported upon above show us that there are many influences operating upon the teeth in the mouth, some of which are detrimental to them in a very high degree, others but slightly, while some, finally, have even a protective action which may vary under different conditions. The total action of all these influences will depend upon how many and which of them are acting together, and upon the resistance offered by the teeth acted upon. This resistance, again, depends to a certain extent upon the structure of the tooth, upon the perfection of its external enamel crust, the enamel cuticle, and upon its freedom from fissures, bruises, cracks, or weak lines such as are produced by uncalcified prisms. The resistance may be modified to a more or less pronounced degree by a process partly of a physical or chemical and partly of a vital nature which takes place in the tooth itself.

SOME GRAPHIC RECORDS OF MOVEMENTS OF THE MANDIBLE IN THE LIVING SUBJECT

AND

Their Bearing on the Mechanism of the Joint and the Construction of Articulators.

By GEORGE G. CAMPION, L.D.S., Manchester, Eng.

(Read before Section I of the Fourth International Dental Congress, St. Louis, Mo., August 30, 1904.)

THE problem of the exact elucidation of the movements of the mandible must be of interest to all dentists who are trying to achieve success in the construction of an anatomical articulator. The method here described of following these movements, and the accompanying graphic records of actual movements in the living subject, may, I hope, interest this section.

Fig. 1 shows in position an instrument consisting of a small tray, shaped like a lower impression tray but without a handle, to the anterior border of which are fixed two brass rods. These issue from the mouth and are bent upward and outward to conform approximately to the contour of the cheeks. To each of them is fixed a plane surface of brass, the two surfaces on opposite sides of the face being arranged parallel to one another. On these slide two other plane surfaces, the positions of which can readily be adjusted and fixed by thumb-screws. Each

of these movable planes carries a brass tube which can readily be fixed in a position exactly over the corresponding con-

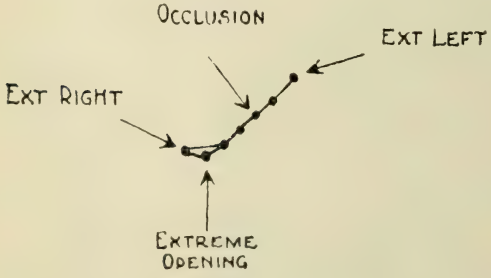
Fig. 1.



Instrument in position.

dyle after its position has been ascertained by palpation. By getting the patient to move the mandible from side

Fig. 2

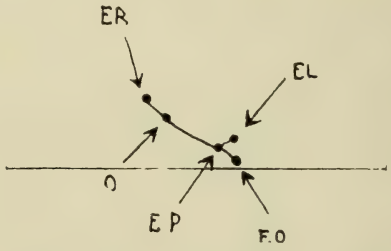


Left condyle. Path nearly straight.

In the diagrams the lettering indicates—O., Occlusion; E.L., Extreme Left; E.R., Extreme Right; E.P., Extreme Protrusion; E.O., Extreme Opening.

to side the positions of the condyles can be determined with ease and the tubes fixed exactly over them. When the tubes have been thus adjusted they project from the sides of the face perpendicularly to the skin covering the condyles. A pointed piece of brass rod slides easily but accurately in the tubes, and after the instrument has been fixed rigidly to the lower teeth by modeling composition and the tubes accurately adjusted, the point of the sliding brass rod being charged

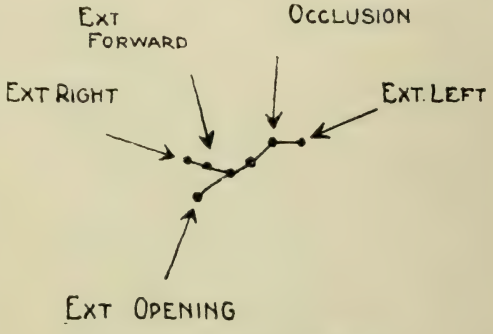
Fig. 3.



Right condyle. Path nearly straight.

with some coloring matter which does not readily dry (such as rouge mixed with oil to a creamy consistence), the varying positions of the condyles can be readily indicated by a succession of dots on the skin. A piece of white blotting-

Fig. 4.

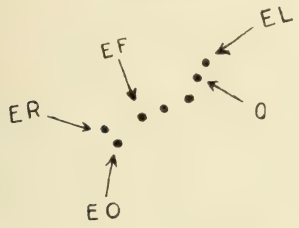


Left condyle. Path sigmoid.

paper is then gently pressed over them, and from this the record can be easily transferred to paper or a ground-glass lantern slide. By using a piece of blotting-paper about three inches long by one inch broad with a penciled line drawn along the middle of one surface from end to end, it is easy to record the relation of the condyle path to an imaginary line from the external auditory

meatus to the lower border of the nose, and thus show approximately the relative slope of the condyle path in different in-

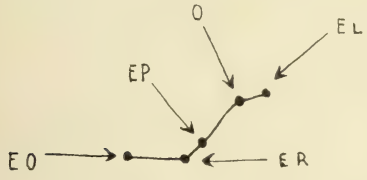
Fig. 5.



Left condyle. Path irregular.

dividuals. The positions recorded explain themselves when it is stated that in those of extreme protrusion and extreme right and left the teeth were as

Fig. 6.

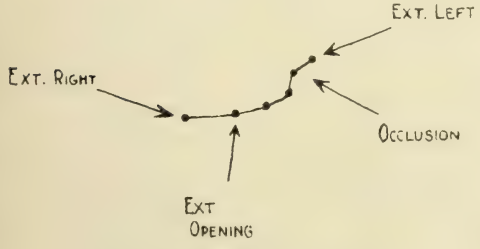


Left condyle. Path sigmoid.

nearly closed as the apparatus would permit.

The accompanying records of actual condyle paths in different individuals show wide variations—an almost straight

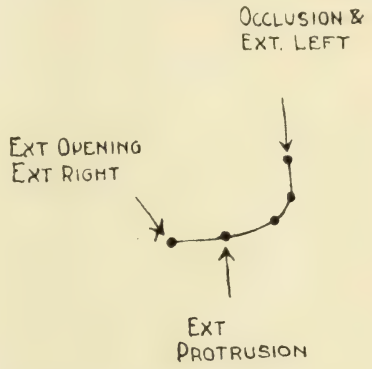
Fig. 7.



Left condyle. Path sigmoid.

line, sigmoid curves of differing lengths and curvature, and curves of unequal convexity. The slope of the condyle path also varies greatly, being usually downward and forward, but often nearly horizontal, in one case of those shown being forward and actually upward. Now, these variations in a number of unselected cases show at a glance how futile must be any efforts to construct an anatomical articulator on the lines of Bon-

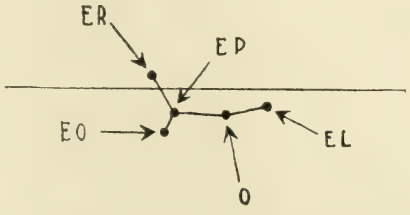
Fig. 8.



Left condyle. Path markedly convex downward.

will, Walker, Schwartz, Christensen, and Gritman, and that no articulator can be in any real sense "anatomical" in which the condyle paths are not capable of being specially arranged and adjusted for each individual case. To Mr. J. B.

Fig. 9.



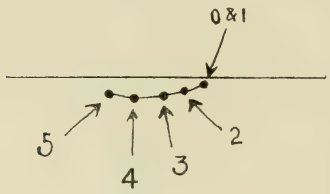
Left condyle. Path markedly convex downward, but the sliding movement is forward and upward. This was associated with great attrition on all the teeth.

Parfit of Reading, Eng., belongs, I believe, the credit of being the first to construct an articulator which embodies this essential point.

Three other slides represent the positions of the condyle in occlusion and when opened successively to the extent of one, two, three, four, and five centimeters —except, indeed, where the mouth could

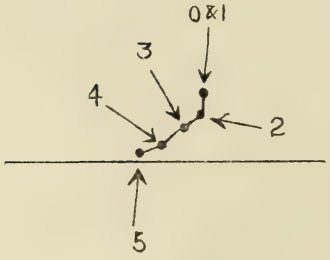
not be opened to this full extent. In obtaining these three tracings care was taken that in closing on the pieces of metal of these different measurements the mandible was not in any way protruded, but was held back as far as possible in the position which obtains in occlusion. It will be noticed in these

Fig. 10.



Left condyle.

Fig. 11.



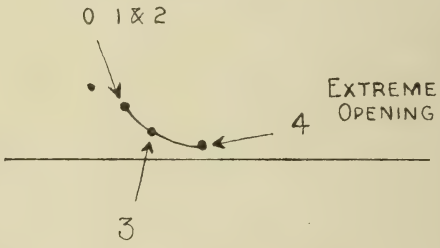
Left condyle.

Figs. 10 and 11. Showing relative positions of condyle—at occlusion, and with mouth opened to extent of 1, 2, 3, 4, and 5 centimeters respectively.

tracings that the position of the condyle in occlusion coincides exactly in two cases with its position where the amount of opening is one centimeter, and in the third case with the position where the opening has been to the extent of two centimeters.

It has been suggested that in the movement of opening the mouth the mandible rotates about an axis situated about one and a half inches below the two condyles, and that an articulator should be so arranged that its hinge should be placed in approximately a corresponding relation to the teeth of the case under treatment. From the various curves shown it would seem that both these conclusions are erroneous, and that there is and can be no one axis about which the mandible moves in opening the mouth, but that the movement is a complex one, consisting first of a rotation of the bone on an axis passing approximately through the centers of the two condyles, and secondly of a forward and downward movement of the condyles as they slide over or with the meniscus-shaped interarticular cartilage along the curve of the eminentia articularis. The

Fig. 12.



Right condyle. Relative positions of condyle—at occlusion, and with mouth open 1, 2, 3, and 4 centimeters respectively.

actual movement would seem to be a complex one, consisting approximately of more or less simultaneous rotation about two axes, one passing through the centers of the curves of the articular surfaces of the two condyles, the other through the centers of the curves of the two eminentiæ articulares. It will also be clear that if in opening the mouth to the extent of one centimeter the movement is one of rotation about an axis passing through the two condyles, then in adjusting models to an articulator they must be so arranged that the hinge of the articulator must be in the same relation to the teeth or alveolar processes as the centers of the condyles are in the living subject. The only part *of the opening movement* which an articulator is concerned to reproduce is the initial stage, which is seen in the tracings to be a simple rotation about an axis passing through the condyles.

THE INFLUENCE OF THE GROWTH OF BONE ON THE ARRANGEMENT OF THE TEETH.

By Mr. J. G. TURNER, London, Eng.

(Read before Section I, Fourth International Dental Congress, St. Louis, Mo., August 30, 1904.)

WHAT I wish to suggest to you is briefly this—That the normal orderly arrangement of the teeth in the jaws is the result of normal growth of the bone, and, as a corollary, that most deformities of the dental arch are a consequence of disordered growth of bone.

The most striking instance of the dependence of the teeth on the bone is seen on the eruption of the three permanent maxillary molars. When first laid down the occlusal surface of each one in turn faces backward. With the backward enlargement of the maxilla (and antrum) the tooth becomes rotated and carried downward till it erupts with its occlusal surface opposing the lower teeth. To a less marked degree this takes place in the mandible; the three permanent mandibular molars are first found with their occlusal surfaces looking forward and upward; with the growth of the bone the tooth is rotated till it erupts with its occlusal surface facing the upper teeth.

Again, in the normal process of growth the temporary front teeth become markedly spaced before they are shed and carried forward by the normal growth of bone.

That bony growth is capable of bodily translating a forcing tooth, capsule and all, is seen in what happens to the lower bicuspids after early extraction of the first permanent molar. The tooth is carried backward till it is arrested by the second molar. Fig. 1 shows a case in which the second bicuspid is erupting in this position, and Fig. 2 a case in which the teeth are being carried backward after eruption. These cases are from my own patients, and I can vouch for the extraction of the first molar. Such movement is by no means uncommon, but the amount of movement varies with the interlocking of the bite, the

FIG. 1.



action of the lips and the mechanical stress of mastication, which may force the second molar forward.

Now, if these movements be due to growth of bone, we ought to find corresponding abnormalities in cases where bony growth is interfered with. That is, if the growth of bone is partially or practically suspended during a certain period, we ought to find the teeth of that part fixed in positions corresponding to the places they should have obtained at the date of this suspension; if growth has been only slowed, then they should be found in positions more or less nearly approaching the positions they should take up at an early period of life. Briefly, the teeth should retain more or less their fetal positions, if the word fetal may be applied so far forward in life.

Cases of persistent naso-pharyngeal obstruction afford us a ready means of testing this theory. In these cases there is want of growth of all the bone forming the upper air-passages, including the maxillæ. Now if we examine a child of from five to six years who has for some time been the subject of marked adenoid obstruction, in place of the normal spacing of the front temporary teeth they will be found unspaced or even crowded in a manner recalling their earlier relative positions before eruption. (Fig. 3.)

Consider such a case of open bite as is shown by Fig. 4. It is from an adenoid boy of twelve. Obviously the front parts of the maxillæ are deficient in vertical or in lateral dimensions. Had growth of bone progressed normally the teeth would have been carried down to a normal occlusion and outward to a regular arch. But growth has failed, and the teeth are left in positions, or nearly so, which once were normal to them.

Now consider the familiar V-shaped or saddle-shaped arch. Fig. 5 is from an adenoid child of eleven with upper protrusion. At this age she was operated on and the obstruction cleared away. Normal growth was resumed and the second molars were erupted in positions belonging to a wider and more normal arch than is occupied by the more anterior teeth. (Fig. 6.) Had the obstruction persisted, there would have been

Fig. 2.

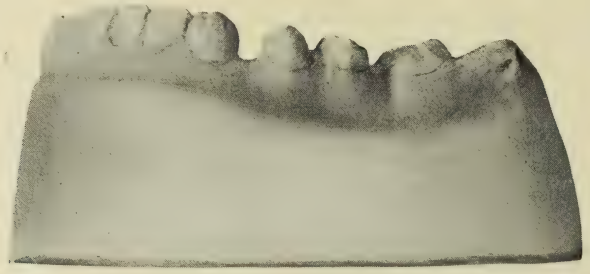
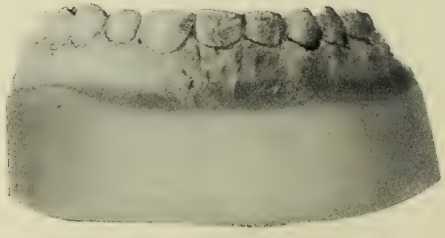


Fig. 3.



no such obvious amelioration in the width of the arch, and the teeth would have erupted in positions corresponding

Fig. 7 shows such a case. The second molars are in positions in a rather wider arch, and the third in a far wider one.

Fig. 4.

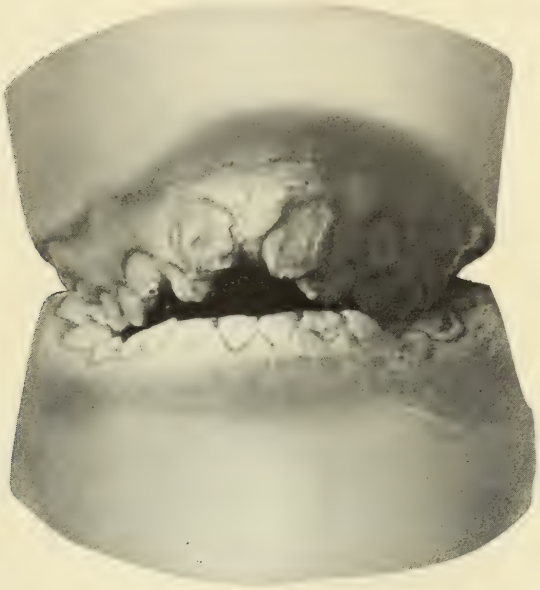
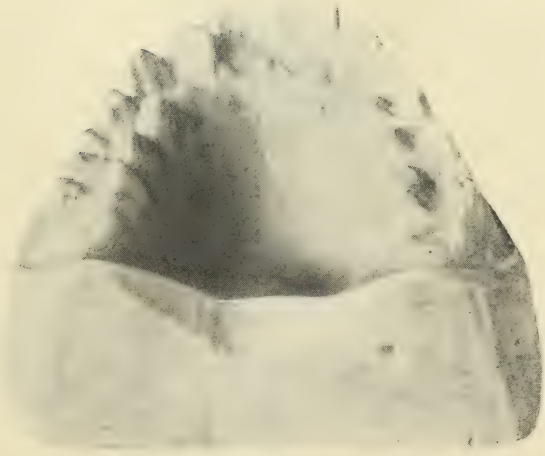


Fig. 5.



to the want of (lateral) growth of the maxillæ.

If the patient be left to "outgrow" his adenoids, in many cases he will partially do so, and the result will be seen in the positions of the second and third molars. The widest part of the dental arch is now at the third molars instead of at the first. With the resumption of growth the second and third molars have been carried outward to more nearly normal positions, while those parts whose grow-

ing period has passed have been left in their abnormal state.

These considerations have suggested to me that we do not give sufficient importance to growth as a factor in dental arrangements. I do not suggest that this stands alone as the only factor, nor that teeth do not react on the bone. There are such other factors in producing the various dental arrangements commonly found as pressure of cheek and lips, etc., and the alveolar part of the bone shows a marked dependence on the presence of teeth for its existence. But the disengagement of the teeth from their "fetal" positions and their translation to their positions in a normal arch is the work of growing bone; and whatever interferes with growth interferes with the perfection of the dental arch, and when the growing period has passed any deformity that is left is permanent.

Fig. 6.

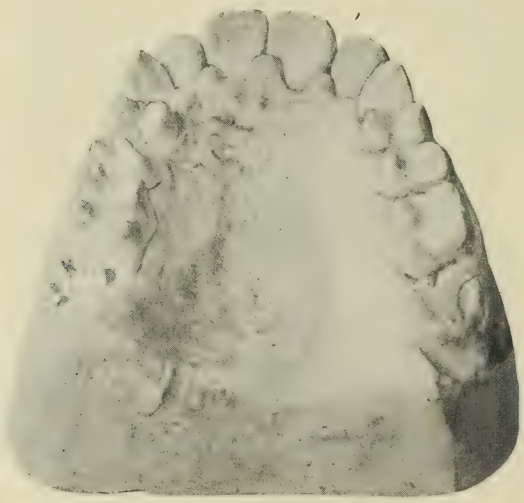
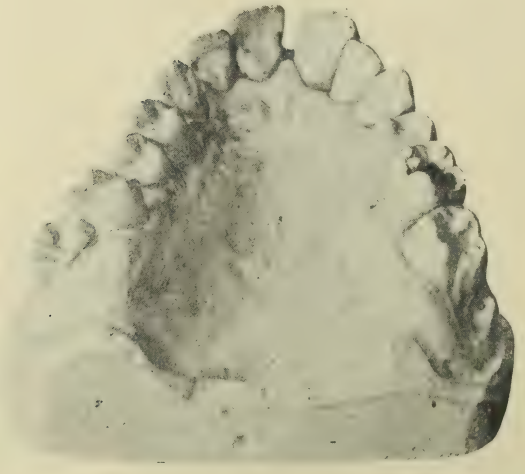


Fig. 7.



CONSTITUTIONAL CAUSES OF TOOTH-DECAY, EROSION, ABRASION, AND DISCOLORATION.

By EUGENE S. TALBOT, M.S., D.D.S., M.D., LL.D., Chicago, Ill.

(Read before Section II, Fourth International Dental Congress, St. Louis, Mo., August 30, 1904.)

TO Dr. W. D. Miller is due the honor and credit *par excellence* for his masterly discovery of the local causes of tooth-decay. Unlike etiologic discoveries in other diseases, that of lactic acid ferment but partially suggests prophylaxis. Indeed, despite treatment, tooth-decay is more rapid and widespread today than formerly; with each generation ushered into the world the ravages of decay increase. This being the case, what are the underlying factors influencing these conditions?

The underlying factors which are set forth at length in my paper entitled "Anatomic Changes in the Head, Face, Jaws, and Teeth in the Evolution of Man," read in the Section on Anatomy, Physiology, Histology, and Microscopy* —comprise the phases of the evolution of the face, jaws, and teeth. These are modified by neurasthenia and faulty nutrition of one or both parents or the child, or of all combined. If this be doubted, let the skeptic compare his patients with children of similar ages in any school for degenerates in this or any other country, or compare healthy normal children with the degenerates of the same family. Naturally, the secretions of the mouth are vitiated by the conditions named, and the lactic acid ferment is assisted. Vitiated excretions, however, do not account for all facts in the following cases.

A woman, twenty-two years old, a lifelong patient, became pregnant. Her teeth, which had been in fine condition up to this period, decayed rapidly thereafter. Caries appeared around new fillings and many new cavities occurred within twelve months.

A girl of fourteen years had her teeth put in order in September 1903. She went to a preparatory boarding-school. She returned in June 1904 with thirteen cavities, some around fillings but mostly new ones.

A man forty-six years of age, a broker, had sound healthy teeth with few fillings until an attack of nervous prostration consequent on business strain occurred, when his teeth decayed rapidly, softening so that the detritus could be removed like leather.

A minister of thirty-eight years with a fine set of teeth broke down in health from overwork. After three years' absence in France he returned to America with every tooth decayed, twenty-one of his teeth having to be crowned.

A woman of forty-six years had two sons and a daughter. The daughter at eighteen was attacked with peritonitis and died within a week, thereby plunging her mother into deep depression. The mother's teeth, previously in good condition, presented in eight months many cavities.

A woman of forty-two years, well-to-do financially; her husband had charge of her property. She went abroad for two years, and he was to bring her home at the end of that period. He failed to do so, and kept her abroad for two years more. Remittances became short, and she returned to find that her husband had squandered her property, and she obtained a divorce. Resultant worry, according to the dermatologists consulted, turned her hair white. There was marked

* See DENTAL COSMOS, November 1904, vol. xlvi, p. 897.

recession of the alveolar process and gums from interstitial gingivitis, as well as rapid tooth-decay.

The husband of a woman of thirty-five years suddenly died, plunging her into deep depression. Her teeth softened rapidly and decayed.

In all these cases abrasion or erosion or both, and in some cases discoloration of tooth-substance, occurred. That teeth decay during illness all observers admit.

A surgeon of sixty-four years with arterio-sclerosis has an unusually well-marked abrasion and erosion with interstitial gingivitis and loosening of the teeth.

A mechanical engineer of forty-eight years has rapid erosion, discoloration, interstitial gingivitis, and loose molars.

Smale and Colyer* have observed erosion and abrasion with gout.

Tomes† mentions the case of an anemic girl reduced to prostration by acute dyspepsia and confined to her bed for some time. She was so hysterical that it was difficult to correctly diagnose her condition. At one time, there was great tenderness of the teeth and general periostitis in the front of the mouth, which to judge by the color seemed to have resulted in the death of the upper central incisors. The use of alkaline applications had no effect, but the patient's general condition improved and the disease made very little progress.

Marshall‡ relates the case of a man of forty-five years in which the six anterior teeth and the right first bicuspid of the upper jaw were greatly affected, the enamel being completely removed from the anterior surfaces of all the teeth mentioned, with a considerable portion of the dentin, leaving an inclined plane pointing backward and extending from the margin of the gums to the ends of the teeth, shortening the anterior teeth to the extent of about the sixteenth of an inch.

The denuded surfaces were not all grooved in one direction; the central incisors and the left lateral were grooved horizontally like the others, but were also grooved longitudinally at the cutting edges.

Many cases of erosion, according to Darby,* are associated with the gouty diathesis. This constitutional condition is, in his opinion, an important factor in causation.

Miller† mentions the case of a man of forty-five years who was in fair health with the exception of an occasional attack of asthma and a rheumatic tendency, and who was the subject of a well-marked case of erosion.

My attention was called to erosion and abrasion three decades ago, while making investigations among neurotics and degenerates for other purposes. Degenerate children were found to have erosion and abrasion of the temporary as well as the permanent set of teeth. In paretic dementia—a disease which usually runs a rapid course and terminates in death—abrasion is almost always marked; sometimes erosion occurs. In locomotor ataxia erosion and abrasion are always present, frequently to a marked degree. In practice I find erosion and abrasion of the temporary teeth—especially of the incisors and canines that have remained in the mouth for a longer time than normal—after the roots have become absorbed and the pulps have been destroyed. Patients with hard, sound normal teeth up to a certain period, may afterward, from neurasthenia, degeneracy, or grief, show marked traces of erosion, abrasion, and decay. The same is true of syphilis, tuberculosis, or any other constitutional disease.

Erosion and abrasion are often seen in the permanent teeth after the pulps have been destroyed.

Erosion, according to Miller, "is an effect observed in healthy teeth with living pulps, as well as on pulpless teeth, and on natural teeth worn as pivot teeth or on artificial bases."

Erosion and abrasion are observed upon the cutting edges of the anterior

* "Diseases and Injuries of the Teeth," p. 280.

† Marshall's "Operative Dentistry," p. 363.

‡ *Trans. Amer. Med. Association*, 1884.

* Marshall's "Operative Dentistry," p. 366.

† DENTAL COSMOS, March 1904, vol. xlvi, p. 177.

teeth, especially the central incisors where there is no friction from opposing teeth. Occasionally the central incisors, either upper or lower or both, alone are involved.

Erosion and abrasion are found in mouths with healthy gums and mucous membrane and upon teeth in localities where acid secretions could have no effect. The character and shape of the abraded surfaces indicate that the origin is from friction.

Change in color of the teeth is often very rapid after prolonged illness, such as pneumonia, typhoid fever, syphilis, tuberculosis, etc. I have noticed many cases of change in color after illness in persons who have had partial sets of teeth or when a crown had been inserted. All are familiar with the rapid change in color as patients advance in years. Teeth often change color during pregnancy.

I purposely grouped "Constitutional Causes of Tooth-Decay, Erosion, Abrasion, and Discoloration" under one heading for the reason that I expect to show that the changes which take place in the pulp from constitutional disturbances modify tooth-vitality. The local causes are thereby accelerated. In all the cases enumerated, either the nervous system or blood supply or both are involved. While all of these lesions are observed early in life, they are most active after forty years of age. It is especially at the senile stage—the fifth period of stress, or period of involution, when the excretory organs, from overwork or nerve tire, cause faulty metabolism and auto-intoxication—that the teeth undergo changes indicated by rapid decay, discoloration, erosion, and abrasion.

Changes taking place in tooth-structure must necessarily occur either in the blood stream or nerve tissue. Investigations of nerve lesions have demonstrated that in most diseases, nerve-end degeneration takes place, as Sidney Kuh* has shown. In some of the toxic forms, as for instance in neuritis due to poisoning with lead and arsenic, the cells of the spinal cord as well as those of the spinal ganglia and brain may be diseased and the toxic substances may attack these cells before the nerve fiber itself is altered. This hypothesis explains why pronounced degeneration of peripheral nerves occurs without causing any appreciable symptoms. Pitres and Vaillard first showed that after typhoid fever many nerve fibers are found degenerated in cases where during life symptoms of neuritis were absent. The same observer found like states in the nerves of those who had died from tuberculosis. Later observations have extended these conditions to such diseases as diphtheria, syphilis, alcoholism, carcinoma, inanition, marasmus, arterio-sclerosis, and leprosy; in the so-called rheumatic neuritis of the facial nerve, and in inflammation due to articular rheumatism, gout, puerperal infection, tuberculosis, etc.

The method of cell-poisoning has been observed in other intoxications.* Certain groups of neurons are more susceptible than others to a given intoxication. The same group of nerve cells in two individuals may react very differently to similar doses of the poison. The syphilitic toxin shows a decided preference for certain parts of the cerebral cortex, other areas being less affected. The nerve endings in all parts of the body are markedly involved, especially those in and about the teeth. Peripheral nerve degeneration results where the blood current or the nerves themselves are involved from faulty metabolism, neurasthenia, etc.

If disease affects nerve endings elsewhere in the body, it is but reasonable to believe that nerve endings, bloodvessels, and connective tissue in the pulp will likewise be involved, since the pulp is an end organ situated within bony walls, and a transitory structure is doubly susceptible to disease. The tooth-pulp is at its highest physical development when it commences to form dentin. From that time it degenerates; it begins to lose its blood supply and its nerve energy. As age advances, the blood and nerve supply is almost at a minimum. Is it surpris-

* *American Medicine*, vol. iii, No. 21, pp. 865, 868.

* Barker, "The Nervous System," p. 243.

ing that so few pulps are found in normal condition?

For the past eight years Dr. Vida A. Latham and myself have made a special study of dental pulp pathology. The results of our efforts have been presented before the Section on Stomatology of the American Medical Association and published in both medical and dental journals. Teeth in all stages were obtained from patients suffering from many diseases. These teeth upon removal were placed in warm water, salt solution, and Müller's fluid. The pulps were removed and placed in Müller's fluid, Ehrlich's fluid, formalin, and in Weigert's chrome alum solution. Sections were cut by the freezing method and stained. The staining was done by the following methods: Weigert's osmic acid and hematoxylin, Mummery's iron and tannin, iron and hematoxylin, Freund's gold, Underwood's gold, and lemon juice and gold.

Weigert's stain for medullated nerves was used on tissues hardened in Müller's chrome alum, and good results were obtained with both Müller's and formalin hardened tissues, the medullated sheath of the nerves taking the stain.

The osmic acid method was used similarly to the above, and gave good results following Weigert's chrome alum solution.

Mummery's iron and tannin, used after Müller's fluid, stained the nerve fibers, but the results were not so good as with the two previous stains. Mr. Howard Mummery, however, has been able by this stain to trace fine nerve fibers from the nerve bundles.

Iron and hematoxylin gave good results, the fibers in some places being traced to the apex of the pulp.

Of the different gold methods, Freund's has given us the best results, although some of the results of staining tissues hardened by all the methods have been good.

In a general way, pathologic conditions of the pulp were demonstrated—vascular changes and circulatory disturbances, thrombosis being very common, as also embolism, because of the vast number of loops and want of expansion; endarteritis obliterans, and arterio-sclerosis. These diseases are based, in a measure, upon pulp-embryogeny, anatomy, environment, and to the end-organ nature of the pulp, as already stated.

Some years ago* I demonstrated the nerve endings in the coats of the bloodvessels of the pulp, showing its vasomotor system. The sympathetic system in disease, therefore, must play quite a part for good or evil in nerve endings and bloodvessels of the pulp. In a later paper† I demonstrated Wallerian degeneration and nerve sclerosis, showing that changes in nerve endings and nerve tissue involve the pulp.

As a result of disease of the bloodvessels and nerves of the pulp with external influence, there are retrogressive changes of inflammation: abscess, cloudy swelling, fatty degeneration, mucoid, colloid, hyaline, amyloid degeneration, pulpstones, spheritis, neoplasms, fibroma, etc. Some of these conditions have been discussed by Wedl, Tomes, Smale and Colyer, Hopewell-Smith, Black, Bödecker, Arkövy, Andrews, Römer, Morgenstein, Caush, Latham, and many others, whose details can be studied at length in the original monograph.

It now remains to demonstrate what relation the pulp bears to tooth-structure and tooth-resistance. I cannot do better than quote at length from a paper entitled "The Vital Action of the Dental Pulp,"‡ by the well-known scientist, Dr. R. R. Andrews:

"When the tooth is fully formed, the principal function of the pulp is for vitalization of the substance of the dentin, by means of its fibrils, which permeate into every portion of the matrix of the dentin. Its function is not only to vitalize, but it may again assume its formative function whenever causes for repair demand this. . . . We cannot look on its tissue in life; . . . conclusions must be drawn from what is shown to have

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* *Journ. Amer. Med. Association*, December 19, 1903.

† *Dental Digest*, December 1903.

‡ Read before the American Medical Association, Section on Stomatology, at Atlantic City, June 7, 1904.

taken place when the tissue was alive; the living pulp, with its bloodvessels and nerves, nourishes the dentin; vital changes do take place, and the pulp is the source of vital action. It is a living organ, subject to any physiologic or pathologic process which may act on any living matter; its connection with the general economy must be similar to that of other tissues. It will respond to the action of returning health, and caries which has commenced has been arrested by this vital action, appearing as polished blotches on the teeth, which are not uncommon. Professor Miller, in his work on 'Micro-Organisms of the Human Mouth,' calls this condition a spontaneous healing of dental decay. The dentin, which had become softened, has become hard again, and the decaying process is stopped. This change also takes place in the temporary teeth. The healed dentin retains its discolored appearance, but becomes nearly as dense as normal dentin. These changes have been brought about by vital action, and this action came from the agency of the pulp.

"When the dentin is irritated by infection or its surface is uncovered by a break, there immediately follows a period of vital activity. If sections of a tooth made when these changes are taking place be examined, the formative cells in that portion of the pulp nearest the point of repair are found filling up with glistening globular bodies and the tissue about it is showing an increased vascularity, as though active formative action were taking place."

Andrews was satisfied that these appearances were the result of the vital action of the pulp in its efforts to repair the tissue and that the minute glistening particles within the canals were in many ways similar to the minute globular bodies found in the tissues while the dentin matrix was developing.

"The protecting consolidation is found in teeth that are worn down, usually in the mouths of old people, and when this change has taken place these teeth are not liable to decay again, except under very favorable circumstances. . . . These changes are due in a large measure to normal conditions as regards the vitality of the individual; but in cases where the constitutional condition is below the normal, even where conditions seem favorable to decay, there is always an attempt made to retard the infection. Under certain conditions of environment and infection, penetrating decay is so rapid that the vital action of the pulp is overwhelmed, and the pulp becomes exposed and is in a pathologic condition even before the breaking away of the cavity walls.

"The pulp is the central and largest source of vitality to the tooth, and it acts through its myriads of fibrils. . . . Pain of the dentin following the touch of an insrument or from any irritation is exposed through the agency of these fibrils, and we become conscious of the sensation through them. . . . The dentin is and was meant at all times to be a living tissue. It receives impressions of injuries and responds by processes of repair. Some of the ablest men in the profession have questioned the further value of the tooth-pulp after the full formation of the tooth has taken place. They look on it simply as a formative organ and consider its mission closed with the formation of the tooth. It is, therefore, in their judgment quite as well to destroy it, take it out, and fill its chamber. The microscopic appearance of dentin after the pulp is removed shows that a large amount of dead organic tissue is left within the canals that cannot be taken out, and the dead tissue is a source of considerable danger to the health and vitality of the pericementum. . . . With death of the pulp, not only is sensation in the dentin lost, but also all the changes which vitality gives to an organ, such as nutrition and recuperation. These can never by any possible means be revived. . . . In cases of a lessened vitality we may expect more or less pericementum trouble, a darkening of the tooth, a recession of the gums, and an absorbing of the alveolar processes. The tooth is beyond the influence of any systemic process, and there is no probability of a change for the better."

Many of the facts here depicted by Dr. Andrews have been observed by most practitioners. The vividness of the portrayal of the vitality of the pulp must be appreciated by all. If under certain conditions the pulp can take on recuperative power at any period of life, retrogressive changes must also occur under certain conditions.

In summing up, it is clear that owing to the evolution of the face, jaws, and teeth, the teeth are naturally prone to degeneration (decay, erosion, abrasion, and discoloration). While the law of the survival of the fittest, so far as general health, obtains, evolution and degeneration of the teeth are progressing, slowly but surely. The influence of taint and disease are carried with the teeth from generation to generation. The chances for recuperation of tooth-structure by the inheritance of better blood-making are not so great as in the case of other structures of the body. The tooth has always been a very variable factor in evolution.

In somatic diseases, in metal and drug poisoning, in pregnancy, as well as in pulp-disease itself, vital action of the pulp is involved. Vital changes take place, the fibrils become diseased, tooth-resistance is lost, discoloration and softening of tooth-structure occur. Friction wears away the teeth, and, owing to want of tooth-structure, lactic acid ferment causes rapid tooth-decay.

THE VALUE OF DILUTE SALINE SOLUTIONS IN ORAL HYGIENE.

By PERCY R. HOWE, M.A., D.D.S., Boston, Mass.

THE assertion that the majority of aromatic mouth-washes in common use today are not only useless but are positively injurious has a large element of truth in it. That so potent a means for good in the treatment of oral disturbances should be so inefficacious is indeed deplorable.

Dr. Miller, after all his elaborate research on mouth bacteria, says: "A great difficulty lies, further, in the fact that nearly all materials which possess antiseptic action are either contra-indicated altogether in the mouth or they may be used only in very dilute solutions, either because they are injurious to the general health or locally to the mucous membrane or to the teeth themselves. Finally, many otherwise useful antiseptics are excluded because of their bad taste or smell." From which we might conclude that it would be well to consider some other method of controlling bacterial invasion and progression than by the action of germicides directly on the bacteria themselves.

In following out the minute processes of nature we are investigating things intricate, actions complex, and often we reach conclusions concerning methods of treatment that experience teaches us need amending.

We see in general surgical practice that the germicidal treatment has undergone a change; that at the present time about the only solutions used in washing out cavities within the organism are normal salt solutions or sterile water; that in opening pus cavities, walling off the pocket and inserting a drainage tube is about the only treatment; for further interference is an interference with nature's processes, as experience has taught. So, too, in the therapeutics of tuberculosis, the failure to destroy tubercular tissue by antiseptics has been pointed out and methods of treatment employed that engender a condition of "cell resistance."

More germane to the subject that we wish to present are the ideas which are being followed by eminent practitioners dealing with mucous surfaces of the throat and nose; and in many respects they are equally applicable in the treatment of the tissues of the oral cavity. This method of treating is by the introduction of the neutral and alkaline salines.

In addition to the irritant and meager antiseptic action of our present washes, they have another undesirable action upon the oral secretions direct, and that is a precipitant action. Collect in a beaker some of the oral fluid and shake it together with some one of the common mouth-washes. After settling, a considerable and distinct precipitate will be found. This I have tried with the majority of proprietary preparations on the market, together with formulas in frequent use, as found in text-books or here and there as suggested by different essayists; and almost universally was this precipitant action noted. Whether the supernatant fluid be decanted and the precipitate placed in the incubator, or whether the whole solution be allowed to remain as it settles, in a few hours fermentative action occurs, with an accompaniment of odor not to be tolerated in a hygienic mouth.

The amount of material thrown down depends on the amount of coagulated material in the secretion and its degree of concentration; but in every case it is sufficient to contra-indicate such therapeutics. In considering the "why and wherefore" of this action, briefly recall that the normal mouth fluids are a mixture of the secretions of the salivary glands and of the mucous surfaces, which contain coagulable proteid elements, as mucin, globulin, and serum albumin. Enmeshed in the colloid media are particles of food, epithelial cells in various stages of mucoid degeneration, leucocytes and bacteria. These fluids, too, have to maintain a normal standard of alkalinity and of viscidity, so that any disturbance of their equilibrium, whether local or systemic, lessens their natural power to protect the teeth and soft tissues, and, by the entanglement of bacteria and their suitable food elements, furnish a medium favorable for their growth. It is the coagulation and accumulation of these elements that our mouth-washes produce. The fermentation of this coagulum rapidly ensues. This coagulant action is one of the factors that has caused many germicides to be discarded in operations within the system and in the treatment of affections of the mucous surfaces; and it is the same action which renders them unfit for use within the oral cavity.

Clinical chemistry teaches that in addition to the various antiseptics, alcohols, essential oils and dilute acids, all have this precipitating action on proteid elements; while dilute neutral and alkaline saline solutions are solvents of these elements and of those coagula formed by the products of bacteria and irritation: neutral salines, of cells and serum globulin, alkalines of mucin and of fat. These solutions dissolve cerumen, inspissated catarrhal formations, and pus, and are equally effective in rendering clear the most turbid and viscid saliva.

Perverted secretions that are surcharged with stringy masses of mucin and other organic matter, found in pyorrhea and in catarrhal and other morbid oral conditions, will on the addition of one of the ordinary mouth-washes thicken from a gelatinous product to a dense coagulation of the entire mass. On the other hand, weak saline solutions will not only render clear the secretion as it comes from the mouth, but will also for the most part dissipate the coagula produced by the former treatment.

The use, for instance, of a one per cent. solution of sodium sulfate, a neutral salt, followed by a one per cent. solution of sodium bicarbonate, will effect this result; and such treatment in the mouths of pyorrheal subjects, in children, or in mouths little accustomed to hygienic treatment, will prove that this is theoretical only to such a degree as gives to the practical use of such preparations a sound working basis.

We must be satisfied with calling attention to one more point concerning this

subject, and that is the stimulant, tonic, and alterative effect of saline solutions on the functions of the system at large. With the stimulant effect on the heart's action we are all familiar. Of their tonic effects on the digestive tract, as found in many natural waters, Prof. Dr. Carl von Noorden has treated most exhaustively, in his work entitled "Diseases of Metabolism and Nutrition," showing how in the stomach hyperacidity is corrected and hypoacidity is brought up to the normal standard, and how tenacious mucous deposits in the intestinal tract are removed. The action on cell life exhibits properties of stimulation and tone to such a degree that some very popular and exaggerated fallacies were at one time set afloat by over-enthusiastic scientists.

When we consider that after cleaning with tooth-brush and powder and silk, after tedious and commendable work with stick and pumice, the teeth are immediately inundated with the oral secretions bathed in which they spend their existence, we can understand how important it is that the clearness, limpidity, and alkalinity of normal standards be maintained. We must endeavor to do this by at least breaking up and eliminating food particles and other media for bacteria, and by endeavoring to keep up the vigor and tone of healthy tissues.

The results that have led to the adoption of the saline solutions by general surgeons in their treatment of delicately organized tissues, the action of salines on metabolism and on cell life, together with the correlated facts incorporated in these notes, must at least commend them to a trial.

SOME ANOMALIES OF THE HARD DENTAL TISSUES.

By A. HOPEWELL-SMITH, M.R.C.S., L.R.C.P., L.D.S., Eng.,

LECTURER ON DENTAL ANATOMY AND PHYSIOLOGY, AND ASSISTANT DENTAL SURGEON AT THE ROYAL DENTAL HOSPITAL OF LONDON.

(Presented to Section I, Fourth International Dental Congress, St. Louis, Mo., September 1, 1904.)

IN the following communication I have pleasure in submitting to the congress a few brief notes on several rare pathological conditions of the enamel and dentin of the teeth of man. They are isolated cases, and so far as it is possible to judge are unlikely very soon to be pluralized.

The question of the value of examining and putting on record solitary instances such as those about to be described is one of some importance. Facts are best deduced from a great number of observations, every side of a subject being scrutinized and utilized in all its aspects; incontrovertible proof is most surely obtained from the work of many years and as the outcome of the examination of much material.

It sometimes happens, however, that opportunities arise for the investigation of curious irregular conditions which are seldom met with. A study of such is, however, not valueless, but may by its very obscurity and very rarity serve two purposes. First, it may be possible at times to find that light is unexpectedly but clearly thrown on normal physiological but not easily understood problems; and second, the sum of our knowledge of the workings of the forces of disease may be enlarged, and consequently the guiding principles of prophylaxis or treatment distinctly benefited. On the other hand, it is possible that partly understood processes—physiological or pathological, as the case may be—may be rendered even more complex and leave the mind in a more chaotic state than before. It is to be hoped, how-

ever, that that will not be so in this instance.

The processes of calcification of enamel, dentin, and cementum are defined with some considerable difficulty, and the problems relating to absorption of the hard tissues do not admit of an easy solution. It may be found useful at some distant date to recall the extraordinary appearances presented by the following studies.

DUPLICATION OF THE PULP-CAVITY.

An upper first permanent incisor was removed from the mouth of a young adult for the purpose of relieving the crowding of the anterior teeth. It was apparently sound, save for a longitudinal depression on the mesial aspect of the crown. On preparation and staining it was found to possess two pulp-cavities, each free at the distal extremity but united toward the radicular portion of the neck of the tooth. The smaller cavity was situated on the lingual side. A median vertical section showed that the enamel and dentin of the labial surface was practically normal. But the lingual side displayed several interesting and unique pathological conditions.

The enamel was much thickened in amount—there was what one might term hyperplasia of this tissue. It was, moreover, of poor construction, imperfectly calcified in places, but free from caries or external or internal absorption. It colored vicariously and in patches only by the borax-carmine stain.

Projecting into this thickened enamel, and close to the primary pulp-cavity, was the subsidiary pulp-chamber, whose surface was smooth and did not present the foveolæ of Howship. A thin narrow spur of well-formed dentin, similarly unabsorbed, intervened between it and the free surface of the tooth. Nowhere did the dentin show signs of absorption. It was, generally speaking, fully developed, the tubes ending in the usual manner and extending in the usual direction. The pulp tissue was not well preserved, but fragments exhibited nothing abnormal in its structure.

It is not at all an easy matter to decide as to the method of the formation of the second pulp-chamber. It is possibly due to segmentation or invagination of the enamel organ on the tongue side of the tooth-germ, and dichotomy of the dentinal papilla in the corresponding situation. Had the process continued to a completer stage, there would probably have been found a true gemination of the tooth, by the budding off of a smaller caniniform structure on the inner side.

The invagination of the epithelial tissues might be accounted for by the mutual pressure of large teeth-germs in a small dental arch.

Undoubtedly, had it been necessary to drill into the crown with a bur on the engine, the enamel would have easily snapped off and exposed the pulp in one or both chambers—an element of danger never to be forgotten in the preparation of cavities during the obturation treatment of dental caries.

FALSE PULP-NODULE.

Suppose this carious process had applied to the root portions of the dentinal germ, a condition such as is exemplified in specimens similar to the next to be described would assuredly be noted. Here the anomaly is in the root; in the case just described it was in the crown. For a section showing this irregularity the writer is indebted to the courtesy of Mr. Leslie Hodges, D.D.S., of Birkenhead, who sent him a section of an upper second premolar.

At first sight it would appear that a large pulp-nodule *in situ* was the only pathological change; but this is not so. Attached to one side of the root-canal, and deflecting the pulp from its usual course and position, was a large oval structure of dentin, having a kernel composed of osseous tissue and soft material containing bloodvessels. It soon became obvious, however, that the center of this adventitious body, which must be considered to be a developmental defect, was a compromise between compact bone and hyperplasic cementum. The lamellæ of properly constituted Haversian systems of the former were absent; the

grossly exaggerated lacunæ of the latter were present in a multitude of shapes and sizes. The chief point was the enlarged width of the granular layer of Tomes, with larger spaces than usual. In this respect the periphery of the new structure corresponded very closely with that upon the external part of the cementum, with which it was most probably in direct and continuous communication.

The condition might have been produced by the invagination of a piece of the inner wall of the dental follicle or periodontal membrane, and its inclusion and full development when *in situ*. Precisely how this has been occasioned it is impossible to say. The epithelial sheath of Hertwig—a prolongation downward and then upward of the layer of cells of the internal epithelium of the enamel organ—may, during its formation of the shape of the root, have undergone a spur-like budding, which, projecting inward, produces the appearance noted. At all events this is an example of another obstruction to be met with at times in the root-canals of teeth, and one which makes the total extirpation of a pulp a remarkably difficult if not impossible operation to perform.

ABSORPTION OF ENAMEL AND DENTIN.

The last case to be described presents a most rare and extraordinary condition of absorption of the hard tissues. A mandibular third molar whose external configuration was of a more or less normal character, was divided several times in a vertical direction to ascertain the structure of an osseous mass situated securely on the exposed surface of the crown. After staining with Weil's process it was found that not only had the greater part of the enamel been removed by some obscure pathological process and compact bone deposited in its place, but that the greater part of the dentin was similarly affected.

In one place the amelo-dentinal junction was not only invaded, but the underlying dentin had been removed to such an extent that only a thin layer of hard normal tissue intervened between the pulp and the amelo-dentinal junction. The spaces were thus occupied by a mass of well-formed bone, lacunæ with their bone corpuscles and canaliculi everywhere predominating, and extending as trabeculæ in all directions. The intervening soft tissue presented nothing of a definite structure, as the soft parts had not been retained in their fresh state in physiological relationship to the bone or dentin. It is impossible for enamel or dentin or cementum to become inflamed—their anatomical peculiarities absolutely preclude this—and it is very difficult at first sight to explain the presence of the new adventitious tissue in this situation. Speaking with all reserve, however, it may be that an inflammation of the dental follicle has occurred. Osteoclasts, acting for some long period, had brought about absorption of the enamel surface, more and more of the tissue became removed, and presently the dentin was reached. The pathological work was more rapidly conducted in the latter, because of the ease with which tubular tissue can be absorbed.

Simultaneously with the inward march of an army of osteoclasts came multitudes of osteoblasts and soft tissue freely vascularized from the dental follicle; and the result was a repairing of the breach by the production of true bone. That there had been some inflammatory changes in the periodontal membrane and dental follicle was evidenced by the enormous hyperplasia of the cementum, which in one of the sections extended some considerable distance over the enamel margin. The cementum itself was very lacunated and quite abnormal in character.

It is again obvious that in the operative treatment of such a tooth, a bur on the engine, no matter how lightly used, would suddenly and without warning plunge into the pulp-cavity and expose the surface of that organ.

RECAPITULATION AND SIGNIFICANCE.

All these cases—of the frequency of occurrence of which one is unable to form any opinion—point to the fact that should always be borne in mind when

excavating carious cavities in enamel or dentin and using the dental engine, viz, that curious developmental and acquired defects of these tissues that in themselves are absolutely outside the realm of diagnosis may exist. And extreme care should ever be exercised in the treatment of cavities, lest any such condition as described should, unwittingly on the part of the operator but none the less disastrously, be suddenly and inexplicably discovered.

PROCEEDINGS OF SOCIETIES.

FOURTH INTERNATIONAL DENTAL CONGRESS, ST. LOUIS, MO., AUGUST 29 TO SEPTEMBER 3, 1904.

(Continued from vol. xlvi, page 1072.)

SECTION I: Anatomy, Physiology, Histology, and Microscopy—*Continued.*

Chairman—Dr. M. H. CRYER, Philadelphia, Pa.
Secretary—Dr. W. C. HOUGH, Philadelphia, Pa.

SECOND DAY—TUESDAY, AUGUST 30.
(*Continued.*)

The CHAIRMAN. Dr. Eugene S. Talbot of Chicago was to read a paper in this section today on "Anatomic Changes in the Head, Face, Jaws and Teeth in the Evolution of Man." When first appointed chairman of this section I wrote asking Dr. Talbot for a paper. He accepted at once, and the first paper I received was from him. Yesterday I was notified by the secretary-general that one of our papers should be turned into the general session to be read in the morning, and after considering the matter thoughtfully I concluded that Dr. Talbot's paper was the one best adapted for that purpose. Therefore, with the permission of this section it will be transferred to the general session.

Dr. LITCH. I move that the paper of Dr. Talbot be transferred as suggested by the chairman, to be read in the general session.

The motion was carried.

The secretary, Dr. Hough, read a paper by Mr. Geo. G. CAMPION of Manchester, Eng., on "Some Graphic Records of Movements of the Mandible in the Living Subject, and Their Bearing on the Mechanism of the Joint and the Construction of Articulators." (Printed in full at page 39 of this issue of the COSMOS.)

Discussion.

Dr. C. R. TURNER, Philadelphia, Pa. I wish to say that I am most heartily in sympathy with every effort that is made in the line of securing a precise record of the movements of the mandible with a view of studying those records to the end that an articulator may be made which shall accurately reproduce those movements. The articulator problem appears to me in one of two ways. It is necessary either to view it as an instrument of absolute precision, which shall be set so that it represents the possibility of movements of the mandible for each individual case for which it is used, or as an ideal which is obtained from a composite study of the movements of many jaws. It seems to me that the first of these methods of viewing the articulator problem is essentially the correct one. As Dr. Luce said in his article published in the *Boston Medical and Surgical Journal* a good many years ago, the first thing in the study of the movements of the jaw is to get a record of them. Therefore I

say that I am heartily in sympathy with the spirit of Mr. Campion's paper and with his efforts to obtain accurate records of the movements of the mandible.

Now, the question is as to whether this method is one which will produce accurate results. I should doubt very seriously whether dots placed upon a movable tissue like the skin would accurately record the position of the condyle. Mr. Campion's method of transferring them to a lantern slide or other fixed surface is also open to the objection of inaccuracy. However, I feel that he is quite correct in his statement that the path of the condyle is by no means a straight line, and therefore that instruments which are constructed along the lines of those in which that path is represented as a straight line are constructed upon incorrect principles. And, as he has said, Mr. J. B. Parfit of England is the only one of whom I know who has made any attempt to represent this condylar path by anything except a straight line.

But this is only one phase of the movement of the mandible, and that phase deals with the movement of extreme opening and closing and the movements of incision. The lateral movement of the jaw is one which it seems to me is more important from the standpoint of articulation in dental prosthesis than the forward or the up-and-down movements. I say this because it is of course during the lateral excursion of the jaw and its return to a position of occlusion that mastication of food takes place; and it is during this movement that the teeth must be placed in correct relation to each other so that mastication shall take place. It is very important that the pivotal point about which the jaw makes its lateral excursion in both directions be determined. It has been stated arbitrarily that the mandible rotates about the center of the condyle. I cannot refute this statement by recorded evidence, but I offer this as substantiating my belief that the condyle is not necessarily the point about which the jaw rotates. John Ryder, in an article published in the proceedings of the Academy of Natural Sciences of Philadelphia in 1878, called attention to the fact that, from observation of many skulls of herbivora, reference to the groove which had been worn in the teeth by the lateral excursions of the mandible showed clearly that in some cases the rotation could only have been about a point midway between the condyles; that in others it was about points between this center and the condyles themselves, and that in others, again, it was within the condyles themselves. We see therefore in animals whose principal mandibular movements are lateral, that the center of the condyle is not necessarily the point about which rotation takes place.

Dr. Walker, in an article published in the DENTAL COSMOS in 1896, makes the statement that in the lateral movement of the human mandible in some cases he has observed that as the condyle moved forward on one side, there was a backward movement of the other condyle which in some cases amounted to an eighth of an inch. Therefore it seems to me that there must be definite points about which that rotation takes place, and it appears to me that it is necessary, in addition to securing a record of the directions and form of the condylar path, that we secure a record of the axes about which this rotation of the jaws in the horizontal plane takes place. When that has been accomplished, I think another step will have been taken in the matter of solving the problem of reproducing by an instrument all the movements of the mandible.

At this point Dr. C. R. Turner took the chair.

Dr. CRYER. Mr. Chairman, I wish to say a few words. The subject of the movements of the mandible is a very interesting one, not only from the standpoint of the prosthetic dentist, but from the standpoints of the anatomist, the physiologist, and even the pathologist. Even our best anatomists speak of the mandible swinging from the point of the condyloid process. It certainly does swing against this pivotal or focal point when the mouth is slightly opened—say perhaps in opening it not more than half

an inch between the incisal edges. Such action does not change the pivotal point; but at the very moment the jaws are opened wide enough to take in food the arrangement is changed, and the mandible acquires the character of a floating bone, just as is the case with the hyoid bone. We cannot give any specific description of the movements of the hyoid bone for this reason, viz, that it has no bony articulation. It is controlled by muscles from above, below, anteriorly, and posteriorly, and even muscles coming from various directions control its movements. It will rock or move according to the tension of any one of those muscles, or to the combination of their individual forces. We could not say what the pivotal point is of the hyoid bone. I am inclined to class the pivotal point of the mandible very near to that of the hyoid bone. In a simpler movement, I think, it is at the articulation within the glenoid fossa; but the moment the bone is pulled forward by the external pterygoid the pivotal point changes, perhaps downward and forward in the direction of the inferior dental foramen, and then it will follow a curved direction from that point to the angle of the mandible.

In making X-ray pictures, where the mouth is closed and then slightly opened, the condyloid process is within the glenoid cavity; but beyond these movements it is found to have come forward and downward, resting along the border of the eminentia articularis. We find that this focal point changes so much and so variously that it may become a fixed point at some position, and then, by the action of the external pterygoid, that muscle becomes the opener of the mouth instead of the one to draw it forward. The head of the condyloid process becomes part of the lever to which the force is applied. Therefore the fulcrum is changed, and by its action it succeeds in opening the mouth as well as having the ability to draw the mandible forward.

The paper that has been read before us is very interesting, and I believe that a similar arrangement could be made and attached to the teeth, but instead of having a rod only going up in the region of the condyle, if we will model a piece of brass plate similar to the size of the ramus and the body of the jaw, and have this arrangement made fast to the teeth, I think that then by studying many cases we could get a composite idea, and could watch and see where the pivotal point changes.

In his remarks Dr. Turner spoke of the pivotal point changing from one condyle to another, bilaterally, as I understand.

Dr. Turner. Yes.

Dr. Cryer. I am speaking of the pivotal point changing from the condyle down, while Dr. Turner spoke of its changing transversely. Now, if the pivotal point of the mandible changes horizontally and perpendicularly, the centers of the movement of the jaw will also be at any point between them. So it is exceedingly variable, and I do not believe we can in any way make an articulator on anatomical lines that would be adapted to all cases. We shall have to make an articulator—as Mr. Campion said, I believe—to suit individual cases.

As Mr. Campion is not present, of course he cannot answer the remarks which have been made, and so I will declare the discussion on this paper closed.

The Secretary then read the paper by Mr. J. G. Turner of London, Eng., entitled "The Influence of the Growth of Bone on the Arrangement of the Teeth." (Printed in full at page 43 of this issue of the Cosmos.)

Discussion.

Dr. E. S. Talbot, Chicago, Ill. Mr. Chairman, I regret that the author of this interesting paper is not here, since I dislike to criticize a paper in the author's absence.

The paper is on rather narrow lines; it is, however, one that might bring out considerable discussion. It deals solely with the local conditions, and purely from the dental standpoint. That bone alone has to do with the development of the teeth is quite open to question—if it has very much to do with it, except

in hypertrophy. Where there is hypertrophy of the alveolar process the bone does move the teeth in different directions; the cases here cited are not, however, due to the development of the bone, but simply to the attempt of the teeth to find places to establish themselves, so to speak—or to find a resting-place. If a space be left in the dental arch, and the alveolar process and the bones are developing, the teeth will move either backward or forward as the case may be, to find a resting-place; they sometimes rotate.

To discuss this subject intelligently the pre-natal conditions must be considered. But unfortunately there is a dental trend to look upon all pathological states as being due to local conditions in and about the mouth itself. The influence of the constitution, of embryology, and of evolution is frequently ignored.

Adjourned.

THIRD DAY—WEDNESDAY, AUGUST 31.

The section was called to order at 2.30 P.M. by the chairman, Dr. M. H. Cryer, who called Dr. R. Ottolengui, New York, to the chair.

Dr. M. H. CRYER then read his paper entitled "Some Uses of the Roentgen Rays in the Study of the Internal Anatomy of the Face." (Printed in full at page 1 of the present issue of the COSMOS.)

Discussion.

Dr. E. B. LODGE, Cleveland, Ohio. For the past year I have been doing some skiagraphic work along this line, but my work has been largely with reference to the regions of the maxillæ and teeth.

I have found the X ray invaluable for impacted third molars and for locating the dependent parts of antra and for all manner of abscesses, foreign bodies within the pulp-canals of teeth, and so on. I regret that I am not able to discuss this paper in the way it is worthy of, but I want to say that I thank Dr. Cryer and that I have been a very appreciative listener.

Dr. L. E. CUSTER, Dayton, Ohio. Dr. Cryer has not only shown us something new in X ray, but has also shown us a thing of great importance in the study of anatomy. The X ray is the only means whereby we can get the exact relation of many of the parts of the human being in life. The movements of the mandible in its articular seat can be clearly shown. We also see by an inspection of the pictures of young subjects that the apices of the uncompleted roots have a marked bell-shape appearance, and it would seem that later on there is a folding in of the apex even to the extent of constricting the canal at this point.

Dr. Cryer has been accused of being a little tardy in recognizing the value of the X ray in dental diagnosis, yet I think this presentation, which is so highly creditable, is an ample reward to the profession. The use of stereoscopic X-ray pictures is of great value, and I think it will not be long until extensive use will be made of this method of examination.

Dr. R. OTTOLENGUI, New York, N. Y. I have been exceedingly impressed by certain aspects of this paper. It is useless for me to make any comment on the value of this method in diagnosis, because that is a self-evident proposition. I therefore restrict my remarks to what seems to me to be the remarkable advance that has been made in the making of these pictures over what we might call the beginnings of things which are such a short distance back in the past. And in order that we may more fully appreciate this I want to say one thing about photography. It is fully half a century since photography was first introduced, and the first statement that Daguerre made was that he could expose a plate with his apparatus, and if the object against which it was aimed was brilliantly lighted he could obtain a picture of it in five hours. That was the beginning of photography. Today we take pictures of the most rapidly moving objects. The most wonderful evidence of this that I have seen was a picture taken of a boatload of men from a war-ship rowing, and the picture was so instantaneous that the individual drops of water

in the spray from the oars could be seen. The rapidity of the time required for that picture is almost inconceivable.

Now in X-ray work I wish to call attention to the fact that while people think of this as a photographic process, it is not strictly speaking a photographic process, because no lens is used, and because no negative is made. Someone recently made a mistake in one of the latest numbers of the Cosmos in saying that a picture in white was a negative X ray. As a matter of fact the very first impression that is made, whether it be on a film or on a piece of sensitized paper which is put in with the film, is a positive, not a negative, because it is what might be called a shadowgraph. In other words it is a mere printing process, just as you put a negative against a piece of sensitized paper, and pass the sun through the negative and make your print. In this instance, in place of the negative, a part of the human body is used. The plate is placed against it and the light is passed through it and you make the print, and what you see as a result is a positive. So that gentleman made a mistake when he called it a negative. When he showed his picture with the bones white he had reversed the process.

Now that being the case, and remembering that this work is done without the aid of lenses, all who have looked into photography and who know the difficulty of getting stereoscopic effects with the aid of lenses, will be able to imagine the difficulty of obtaining these stereoscopic effects by this apparatus without the aid of lenses. I assume that these pictures shown here today were taken without lenses.

Dr. Cryer. No lenses were used. The pictures are nothing more than shadow pictures.

Dr. Ottolengui. They are mere shadowgraphs; yet by some ingenious arrangement of the instrument with which you look at them, and of the method of taking the two at one time—

Dr. Cryer. No, the two were taken at separate times.

Dr. Ottolengui. That is even more wonderful. By this means Dr. Cryer has obtained these remarkable stereoscopic pictures.

Now, why is a stereoscopic picture of more importance than the flat print? Because it gives you the absolute relations of things. In the ordinary X-ray picture, one object which is behind another offers the same amount of density, the same resistance to the passage of the ray, whether the object which we are seeking be in front or behind, and in many instances it is exceedingly important to know whether it is in front or behind. It is only by this stereoscopic effect that this can be known. I have in mind a particular case where the X-ray picture was of little value, because it could not be determined which of two objects seen was in front and which behind. This was a case where a tooth was missing in the front of the mouth, and when the X-ray search was made, the picture, very much to the astonishment of the investigators, disclosed an additional supernumerary tooth in the jaw. The question arose whether it was labially placed or palatally placed; this knowledge was needed in order to drill for it and remove it. Nothing but a stereoscopic picture could have disclosed that fact.

Now, I believe that just as photographic processes have changed so that, instead of five hours being necessary, one two-thousandth of a second is a sufficient length of time to obtain a photographic impression upon the plate, so there is reason to hope for great improvement in the making of X-ray pictures. In eight years there has been so much progress that we can now obtain a stereoscopic picture from a dry skull, and this progress gives us abundant reason to hope that we may in a very short time have stereoscopic pictures from the living subject.

I have seen a great many pictures, lateral views of full skulls, and diagnosis has nearly always been obscure in those cases because they have been taken in such a plane that the sides of the jaws have been nearly one over the other. It is a noteworthy fact that in the pictures

shown here by Dr. Cryer, by having the mouth opened the pictures have been taken in such a way as to show a large curve, and you can see the opposite side of the jaws. They are in that particular the most remarkable radiographs that I have seen. That shows that another possibility has been discovered—namely, the taking of pictures from one side of the head and showing the opposite side of the skull as clearly as the front side.

I think Dr. Cryer has given us a remarkably interesting paper, and I wish to express to him my appreciation of it.

Dr. CRYER (closing the discussion). I have little to add to the discussion except that I might mention the fact that stereoscopic radiograms are made by exposing two plates separately in order to obtain accurate views of both sides of the object to be radiographed. The technique consists in placing the plates upon a table constructed for the purpose, the surface of which is outlined to correspond to the sizes of radiographic plates. A sliding board in the under surface carries the plate to its proper position and it is so arranged that each plate will bear the same relation to the object to be radiographed. The object being placed on the table at a point to correspond to its center is now ready for one of the exposures. The tube is suspended above and to the right of the center at about one and one-half inches. After this view is exposed the light is shut off, the plate is removed and substituted by plate two, the tube is moved to a corresponding position on the left, and the second exposure is made. The two seen in combination cause the stereoscopic effect which has been shown in the large stereoscope. It is not only shown in the large stereoscope, but can be shown in the ordinary small stereoscope when reduced to proper size.

In showing the picture today I have two prints taken through the vertical position of the skull. In examining the pictures in one position we look through the foramen magnum, or the base of the skull, up into the upper portion of the skull. Then by reversing the pictures we have a view of the skull from the crown down through to the base.

I do not claim anything original in regard to the pictures I have shown. They have been worked out for some time by others both in Europe and in this country. Credit is due to so many that it would be impracticable to give their names; I will simply say that in the books on X-ray work the stereoscopic X-ray work is fully described, together with the names of the originators. I must add here that great assistance has been rendered me in producing these pictures by Dr. Kassabian of the Philadelphia Hospital.

Dr. Ottolengui spoke of the pictures of the dried skulls. The last two pictures I showed were of living skulls. While conversing with a rhinologist in Europe, after showing him many of my specimens, indicating various shapes and sizes of the frontal sinuses, he said: "These specimens are interesting, but to the surgeon they do not give any idea of the anatomy of the person to be operated upon." The last picture on the screen showed the frontal sinuses so plainly that if a fluid were there it could be detected, and if a dark line were running horizontally through that picture, all that would be necessary would be to put the patient on his back and take another X-ray picture, and you would get another view of that fluid at a different level. In that way a correct diagnosis could be made.

Dr. A. F. SONNTAG, Waco, Tex. I wish to ask Dr. Cryer a question. What is the safe method when applying the X ray to the head so extensively as is required to obtain a perfect radiograph? Have you had any bad results?

Dr. CRYER. In my work in connection with Dr. Kassabian we have not met, in the last two years, with any bad effects—such troubles as burning of the face, or other injuries, destruction of the hair follicles and the like, where one exposure after another has been made. Every part of the body that is not to be X-rayed should be protected by sheets of lead, say "tea lead." It should be bent over the shoulder, and if you want only

the face, you should cover and protect the head and hair. It is well to remember that in making radiographs of the head the exposure should be very much longer than in the case of the hand or chest. The bones of the head are dense, and so a longer time is required. But I do not believe any bad effect will follow the judicious use of the X ray, especially when the other parts are protected as I have already indicated.

Dr. SONNTAG. The reason I mentioned it is that I had occasion to see a very serious case something like a year and a half ago. A gentleman, not a practitioner of dentistry or of medicine, who has made X-ray work a specialty in connection with the University of Texas, in making an experiment on himself, received a very serious burn on his arm. He had been using the X rays extensively on other persons without having any bad results, but in using them on himself he had a very serious case.

Dr. OTTOLENGUI. I think the men who are using the X ray now feel perfectly safe, because they have much more powerful apparatus, which allows the exposure to be very much briefer. Then they have perfect methods of insulating and protecting all the parts except where the work is being done. It is simply a question of using sufficient power to make short work of it, and then not to repeat the operation too frequently. Dr. Price recently showed that the operator should protect himself in this work, because he is constantly putting his hands close to the light; and he now has a glove which he wears which is thoroughly protective and yet elastic enough to enable him to work. I have no doubt that similar bandages for the entire body could be made of this same material.

The following paper by Dr. W. T. ECKLEY, Chicago, Ill., was read by title:

PHYLOGENETIC EVIDENCE BEARING ON THE FUNCTION OF THE ACCESSORY SINUSES IN MAN AND THE HIGHER VERTEBRATES.

The accessory sinuses of the nose belong to a system of pneumatic conduits in animals, and subserve, severally, buoyancy in fishes, olfaction in amphibians, and subsidiary respiration in birds and mammals. Piscine air-bladders, avian pneumatic bones, the accessory nasal chambers in the amphibia, and the mammalian air-sinuses are, then, in reality individual links, differing materially among themselves in size and location, but collectively forming an all-important pneumatic chain connecting racially the vertebrate kingdom and extending upward from the simple true fish to composite man.

The link of the pneumatic chain in homo sapiens has, however, become so profoundly modified by circumstances as to make its functional elucidation unsatisfactory in the extreme without comparative study. The object of this paper, then, is the adduction of phylogenetic evidence looking to the establishment on the broadest possible grounds of the function of the accessory sinuses in man.

In anticipation of proof for the assumption let it suffice for the present that the accessory air-sinuses in man and the higher vertebrates are—(*a*) local organs subsidiary in their action to the lungs in the aeration of the blood; (*b*) obsolete olfactory organs in the entire vertebrate kingdom save alone in the cetaceans.

In birds of flight the wing-bones contain air-cells which communicate with the lungs through air-sacs in the neck, thorax, abdomen, pelvis, and intermuscular spaces. This air, according to Hunter, renders the body specifically lighter, aids mechanically in the action of the lungs, and purifies the blood as does air in the swim-bladder of the fish or in the lung of man. Furthermore, the quantity of air admitted to the bones is proportionate to the rapidity and continuance of the bird's flight, and is distributed to those members most employed in locomotion; hence, the wing-bones of the owl and the femur of the ostrich enjoy superior pneumatic qualities.

During tranquillity pulmonary aeration in owl and ostrich suffices; when, however, extraordinary flight demands an increased amount of oxygenated blood,

a subsidiary respiratory system located in the bones of the most active parts is called into use. Hence the pneumatic cells found in the wing of the owl, and those in the femur of the ostrich, are local respiratory organs of these animals.

Reduced to its simplest terms, the extent of pneumatic bone areas is directly proportional to the demands of respiration, and differs markedly in different species of animals. As all birds are not dependent on extreme flight by wing or leg, it logically follows that some birds have less extensive pneumatic bone areas. Maximal and minimal pneumatic respiratory expedients in birds depend on the local demand for oxygen, and just as the swim-bladder in fishes depends for its size and usefulness on the local requirements of the animal, so too the number of pneumatic bones in birds is dependent upon the analogous requirements.

Terrestrial animals among mammals possess an abbreviated pneumatic system of bones, similar in structure, development, and function to the pneumatic bones of birds, differing from these only in location and extent. The mammalian pneumatic bones are those of the head; the avian, those of the extremities. Each is produced by evagination from a primary respiratory organ. Each consists of bony and membranous parts. Each has an extensive capillary field. Each is located in an area capable of great local activity. Each derives its nerve and blood supply from the same source as that of the region in which it is located. Each is a local subsidiary respiratory organ, called in birds pneumatic bones, in man the accessory nasal sinuses.

Reduced to a general proposition, a subsidiary respiratory system as found in pneumatic bones contemplates bones containing air in free communication with a primary respiratory organ. The number of pneumatic bones may be great or small as determined by the exigencies of the case. The bones possessing these pneumatic qualities may occupy the head or extremities. The animal possessing such respiratory expedients may inhabit air, earth, or water. When primary respiratory air-passages send air-containing processes into bone, the region thus invaded is always one of vital functional importance to the animal, and the pneumatic cells in its midst are, in man as in aves, to be regarded as local respiratory organs.

In those domestic animals on which commerce depends for foodstuffs and draft, the pneumatic bones are cranial. Truistic, indeed, were any reference to the important subsidiary rôle played by the same in the local aeration of blood in the distribution of the internal maxillary artery. No body of scientists in these days is more conversant with the enormous activity exerted by the muscles of mastication during grazing, mastication, and ruminating, than the one I am now addressing. Can anyone accepting the doctrines of Owen and Hunter relative to local respiration in the femur of the ostrich, logically deny the utility of the similar function of the immense air-sinuses in the vicinity of the muscles and bones of mastication in the domestic herbivorous animals? There is not the least doubt that *bos domesticus* during one hour of quiet rumination exerts a greater number of foot-pounds of muscular energy than does the ostrich in a podalic stunt of the same duration.

In the elephant, with an instinct superior to that of our domestic animals, with an immense proboscis for various necessary purposes, with enormous muscles of mastication, all the bones of the head are pneumatic, and significant indeed from a scientific standpoint is the tradition among the Singhalese that sinus disease among a herd of elephants is a divine visitation.

The pneumatic bones of man are confined to the head and are variously designated cell sinuses and antra, a nomenclature founded rather on a difference in size than on inherent structural peculiarities, for they are similar in location, development, nutrition, and liability to disease. The sinuses in man as well as in the lower animals are derived from the nose by evagination, hence their ectodermic epithelia partake of the nature of the nose.

In man the sinuses occur in the maxilla, in the frontal, ethmoidal, and sphenoidal bones—admitting of general, not of specific limitations. They are variable in size in different races and in people of the same race; even in the same individual the sinuses of the two sides may differ.

In conformity with a general biologic rule, the openings of a sinus may occur double—reminding one in this regard of a double ureter for a single kidney; and indeed they present the widest variance in size within physiologic range. The possible disparity in number and size of the openings rests on an embryologic law, immutable and time-honored.

Except in the most general skeletal way sex does not exert influence on the sinuses, and I am slow to believe that post-mortems and clinical experience will ever justify the statement that the floor of the antrum in women is above, in men below, the floor of the nose.

The sinuses in man are tardy in appearing, and with no demonstrable reason develop *pari passu* with the generative organs. Just as the male and female conduits announce their completed canalization by semination and ovulation respectively, so do the sinuses announce their completion by adult qualities of voice.

The simplest olfactory organ in all true fishes is a single paired ectodermic depression above the mouth. The most highly specialized organs of smell in fishes consist of a spindle of neuro-epithelial cells, with an independent disconnected sac, foreshadowing the sinus system in the higher vertebrates.

In the amphibia the accessory nasal chamber, homologous with the maxillary sinus of all vertebrates, contains a part of the olfactory organ, hence in man the maxillary sinus may be considered as a phylogenetic olfactory organ, although functionally obsolete. In the amphibia the olfactory organ divides into a nasal part and an accessory nasal chamber. In some cases these two parts are entirely separated and each has its own olfactory nerves. "There can be no doubt," says Wiedersheim, "that the accessory nasal chamber of the amphibians is homologous with the maxillary sinus of all vertebrates. In no other vertebrates, however, does it retain the character of a kind of separate nasal chamber, but on the contrary the higher we pass in the vertebrate series, the more does the maxillary sinus become separated physiologically from the olfactory organ; it loses its olfactory epithelia and finally degenerates into a simple air-sinus."

Owen's statement regarding the distribution of air to organs proportionate to their activity has a cogent application to the sinus system of terrestrial vertebrates, including men of course. In these the active parts are the brain and the muscles of mastication in the immediate vicinity of immense sinuses. Blood from the respiratory field of sinuses and from the mandibular region reaches the pterygoid plexus, and this latter communicates with the sinuses of the dura mater by emissary veins. As previously shown, the sinuses furnish a capillary field for the local aeration of blood supplying the muscles and bones of mastication, just as the wing-bone of the owl or the femur of the ostrich receive blood for aeration proportionate to the rapidity and continuance of flight.

We have made an endeavor to draw logical conclusions looking to the establishment of the rôle played by the accessory sinuses in man and the higher vertebrates. That the pneumatic bones of the head in mammals are functionally analogous to those in the extremities of birds can scarcely be denied, since by location they are in a region where aeration of the blood is a local necessity; hence we conclude that the sinuses in man are to be regarded as local respiratory organs principally for the brain and the muscles of mastication. It is generally conceded that the frontal, ethmoidal, and sphenoidal sinuses are genetically related to the antrum. In one class of vertebrates only, the amphibia—on the authority of Wiedersheim—does the maxillary sinus serve as an olfactory organ; hence we conclude that in man this sinus is to be regarded as an obsolete phylogenetic olfactory organ.

In addition to the function previously cited, secondary ones may be divined. In the amphibia the accessory nasal chamber, homologous with the maxillary sinus of all vertebrates, contains a part of the olfactory organ, hence in man the antrum may be considered a phylogenetic olfactory organ.

In birds and mammals at an early stage, prior to demands for local subsidiary organs of respiration, bones are wanting in pneumatic qualities. In adult birds the sinuses impart tone and strength to song, hence as a mating factor in birds the sinuses are subsidiary to procreation.

In man the sinuses prior to puberty are in an undeveloped state. Puberty in man is the phylogenetic "period of mating" in the lower animals. The unstable voice of youth as well as the so-called nasal character of the voice in diseased sinuses seems to confirm these latter as subsidiary vocal organs.

The sinuses in birds and mammals develop *pari passu* with the generative organs. Prior to the completion of this strange duality the lower animals remain unmated units, the higher animals are unconscious of their sex. Orators and vocalists are functionally at their worst when the sinuses are diseased; hence the simultaneity in development of sinus and generative organs is more than coincidental, and should suggest the solution of a problem looking to the reciprocal influence on their respective organs, of disease and surgical operations.

In their development the higher vertebrates pass through transitory stages which in the lower animals become fixed structural characters. As a diagnostic expedient, early recognition of structural departure from the normal in man is desirable. In the floor of the antrum of man an elevation of variable height, producing antral pockets, represents in the horse a permanent partition separating the anterior from the posterior antrum. Conchal sinuses, occasionally encountered in man, are permanent in the horse; while in man an accessory ostium maxillare into a conchal sinus is simply a reversion to a fixed structural character in the ox and horse. Those rare instances of palatal and lacrymal sinuses and bulla ethmoidalis communicating with the antrum of Highmore are survivals of a constant condition in *bos domesticus;* likewise survive in the sinuses of higher vertebrates those trabeculæ which in the pneumatic bones of birds give strength and stability.

Looking to the greatest conservatism in the dental art—for dentistry in its most expanded aspect is more than mere local treatment—there is almost an infinite field of usefulness associated with the proper care of the dentures and the intimately associated accessory sinuses of the nose. Unnecessary pain produced by broach or dam necessarily reacts reflexly on the lining of the sinus, for their nerve supply is from the trifacial. In the words of McNeal on the domestic animals, "Infection of one sinus means infection for all." The same is true of the sinus in man. In view of their liability the functions of these pneumatic bones should be borne in mind by the operator.

CONCLUSIONS.

1. The sinuses in man are phylogenetically very ancient structures and are analogous to the air-cells in the pneumatic bones of birds of flight.

2. The function of the sinuses is twofold: (*a*) Local respiratory and subsidiary to the lungs; (*b*) The maxillary sinus in the higher vertebrates is phylogenetically an organ of smell, having its prototype in the accessory nasal chamber of the amphibian.

3. For unaccountable reasons the sinuses develop *pari passu* with the generative organs.

4. The variations are so great as to make classification looking to definite size and shape impossible, and for embryologic reasons each sinus is a law unto itself.

On motion of Dr. Ottolengui, seconded by Dr. Hough, the following papers were also read by title:

Paper by Dr. A. Hopewell-Smith, of

London, Eng., "Some Anomalies of the Hard Dental Tissues."

Paper by Dr. D. E. N. CAUSH, of Brighton, Eng., "Is There Uncalcified Tissue in the Enamel."

[The last-named paper will be printed in full in the next issue of the DENTAL COSMOS.]

Dr. CRYER in his closing remarks thanked all those who had taken an interest in the work of the section, especially those who had contributed papers. In this connection he particularly wished to thank Dr. Wm. S. Haughton, of Dublin, Ireland, for so kindly sending to the section stereoscopic radiograms, which had been greatly appreciated and admired by all who had examined them.

Section I then adjourned *sine die*.

SECTION II: Etiology, Pathology, and Bacteriology.

Chairman—Dr. R. H. HOFHEINZ, Rochester, N. Y.
Secretary—Dr. M. L. RHEIN, New York, N. Y.

FIRST DAY—MONDAY, AUGUST 29.

The section was called to order on Monday, August 29, 1904, at 2.30 P.M., by the chairman, Dr. R. H. HOFHEINZ.

The CHAIRMAN. Before proceeding with the work of the section, I have to announce that the name of Dr. M. L. Rhein of New York has by some inadvertence been omitted from the program. He has kindly consented to serve as the secretary of this section.

While I read my short address I will ask Dr. W. D. Miller of Berlin, Germany, to occupy the chair.

Dr. Miller then took the chair.

Dr. R. H. HOFHEINZ, Rochester, N. Y., then read the following address:

CHAIRMAN'S ADDRESS.

Gentlemen of Section II: It is with much pride and gratification that I welcome you as members of the Section on Etiology, Pathology, and Bacteriology, of the Fourth International Dental Congress. They are the three great sciences which have brought dentistry to its present elevation.

There was in modern nations, at least, a time when dentistry mainly consisted in the art of extracting diseased teeth and of soothing dental pains by means of drugs. From that, dentistry rose to a highly developed technical branch, but it has now reached a status where the happy combination of the practical and theoretical have made dentistry a recognized science.

As one of our distinguished members well said, "Any science based on experience *in* and tending *to* life must be practical as well as theoretical." This, gentlemen, ought to be a self-evident truth to every attentive observer of the evolution and application of science in all its multifarious branches, and most of all, perhaps, in dentistry, which from a much neglected branch of surgery rose to the rank of an independent science by means of theories and practical experiments combined.

It is the theorist who by careful examination of cause and effect, assisted by practical experiments, has heaped observation upon observation, experience on experience, conclusion on conclusion—gathering a treasure of knowledge which well deserves the honorable name of science. In dentistry, as in any other empiric aggregation of facts, the sum of experiences gained leads to theories, the verification of such to scientific principles; and modern dentistry is therefore built up by both theory and practice combined.

Strange it is that even today there should be men who, as Dr. Kirk remarked, look upon such theories and such observations as "scientific things for which the practical man has no use." This

is the same antagonism as was experienced by the scientific physician of the middle ages, when anatomy was tabooed and surgical operations were left to vagrant quacks, considered as outlaws at a time when the University of Paris refused admission to students of the medical faculty who were not willing to swear off the pursuit of surgery.

The practical physician of that time had no use for scientific researches, and he despised any theory based upon it and upon the discoveries made by anatomy. And yet it is an undisputed fact that medicine obtained the rank of a real science only after adopting those branches into the regular course of instruction for medical students, and we know now from the history of its evolution that the astonishing development of medical science would have been impossible to this day without them.

The crude empiricism of the quack was through them replaced by scientific methods based on the perception of cause and effect and logical conclusions. The physician advanced from the low station of the practitioner of thoughtless mechanical routine in rules and prescriptions mostly founded on the *post hoc, ergo propter hoc* principle to a self-thinking scientist basing his conclusions on his observations and who tries to apply his remedies with full knowledge of the cause of the disease and the effect of the agents he applies and prescribes. Every practitioner of the medical and dental sciences forms his theories by his observations, and they approach the real truth in the ratio of their accuracy and scientific exactness. Only lamentable bigotry can deny these facts.

If we had not learned to investigate the phenomena of caries by scientific method and correct reasoning, dentistry would still rest on false and perfunctory observations, or it would perhaps have advanced a little more by slow and hazardous empiricism, with scanty results gained by a great number of lamentable failures.

Goethe says, "Much confusion in science, and in everything else, arises from this, that men who have no capacity for thought will presume to theorize, because they cannot see that mere stores of knowledge, however vast, in themselves give no capacity for thinking. Such persons at starting will go on working with a fair amount of common sense and succeed pretty well; but common sense has its limit, and when it passes beyond that limit it is in danger of becoming absurd. The province of common sense is active life—in action it will not lightly go wrong; but the higher regions of thought, speculation, and broad conclusions are altogether outside of its jurisdiction."

Dentistry has produced many minds who have entered the higher regions of thought and have derived therefrom definite and important conclusions; a number of them will honor this section with some of their mental product. These men and their work have helped dentistry to its present lofty position, and have compelled the medical profession to accept their thoughts and researches as belonging to the great realm of medical science. Thus through its scholars in etiology, pathology, and bacteriology has dentistry won one of the foremost places among the sciences of the twentieth century.

Dr. Hofheinz here resumed the chair.

The Chairman. The first paper which will be read before this section will be on "Constitutional Causes of Tooth-Decay," etc., by Dr. Eugene S. Talbot of Chicago.

Dr. E. S. Talbot, Chicago, Ill., then read his paper entitled "The Constitutional Causes of Tooth-Decay, Erosion, Abrasion, and Discoloration." (Printed in full at page 47 of the present issue of the Cosmos.)

Discussion.

Dr. James Truman, Philadelphia, Pa. I think we can all honor Dr. Talbot for his work in this as well as in other directions. I agree with him, however, only in a certain portion of his paper. I recognize the fact that neurasthenia, faulty metabolism, auto-intoxication, and

everything that goes to injure the general organization are predisposing causes of abrasion and erosion. I cannot agree, however, with him that the pulp, as an end organ, becomes so far diseased as to produce caries in teeth. I have seen but two cases in which destruction or degeneration of that end organ could have produced destruction of the tooth-structure independently of external injuries, and I did not consider that in those two cases it was caries as this is understood.

His other proposition, that erosion can take place in the mouth without any acid action, has certainly to my mind yet to be demonstrated. I have never yet seen a case of erosion or abrasion in which acid action could not be demonstrated, or in which there was no possibility of acid action.

"Erosion" and "abrasion" to my mind are almost synonymous terms. Dr. Talbot makes a distinction between the two, and there seems to be a foundation for this as he describes it. Abrasion could not take place, nor would it be possible save in only the most limited degree, by the mere coming together of two structures in mastication. That action would necessarily be very limited, so much so that it would scarcely be recognized except as a slight loss of substance.

We must recognize the fact that there are two active destructive processes going on in the mouth under the conditions of abrasion. First, acid action, and secondly the attrition that carries away the tissue as it is worn away. I do not believe that this result is produced, except in rare instances, by a single action. A case presented at the University of Pennsylvania, under the care of Dr. Kirk, where there was no attrition at all, and he demonstrated that the destruction of the teeth was the result of altered oral secretions and was not due to neurasthenia or nerve degeneration.

I think it can easily be demonstrated that erosion is the result of acid action, although I do not pretend to say what acid. The ordinary treatment that we are prepared to give in such cases demonstrates therapeutically that it is an acid action that we have to deal with. I have had many cases of that kind where I have caused the erosion to cease absolutely for a number of years by the use of an antacid, such as the use of a magma of prepared chalk on the teeth at night.

In some of the children who have been under my care I have found it to be unquestionably true that the mucous follicles of the upper lip were more directly the cause of the destruction of teeth upon their labial surfaces, and in after years in the production of erosion, than all the degenerative influences that could be brought to bear upon them.

I am therefore not disposed to believe, with Dr. Talbot, that erosion and abrasion can be altogether due to the causes he has enumerated—although I hesitate to oppose him in this matter. Abrasion as a rule is due to a dual action—acid action and attrition—although there are exceptions.

Dr. W. D. Miller, Berlin, Ger. Dr. Talbot has cited a number of cases in which caries of teeth appeared very suddenly and in which the teeth had previously been healthy. In these cases a state of general caries came about within a few months. He has attributed these sudden changes to constitutional causes. Such cases are familiar to us all in our daily practice. I have been of the opinion that the change could be accounted for by some local disturbances—if those disturbances could only be discovered.

About a year ago a colleague of mine suggested that he would like to bring a patient to me for consultation. He stated to me that she was suffering from nephritis and tuberculosis and was in a very poor state of health. Her teeth were formerly in average good condition, but within the year they began to decay rapidly, not only on the approximal surface but as well at the necks and on the margins of fillings. I immediately set about to examine her saliva. I gave her a glass and a pledget of cotton to chew upon; but no saliva came. I asked her if she suffered from dryness of the mouth, and she said she had done so for a year or more. There I had the

cause of the decay in that case. It was not due to either nephritis or tuberculosis, but simply to the fact that she had no saliva, and therefore particles of food remained adherent to the teeth, and the acid resulting from the fermentation of these particles not being diluted by the saliva, acted upon the teeth in full strength.

In looking up the literature of the subject I have found a number of cases in which rapid decay has been incident to the cessation of the salivary secretion.

I am of the opinion, as I have stated, that many of these cases of sudden tooth-decay may be explained in this way by some local causes. A patient who had been under my observation for many years, during which time his teeth decayed comparatively little, suffered from a stroke of paralysis and was unable to clean his teeth. Food lodged between them at the necks, and when he came to me I could detect a smell of strong acid fermentation in his mouth. His teeth decayed about as quickly as I could fill them. But the decay was not due to the paralysis, but to the fact that he could not clean his teeth as he had previously done.

In regard to erosion, I am not convinced that an acid is necessary to bring it about, but that it may result from mechanical factors, either alone or in combination with chemical agents which possibly have a neutral or alkaline reaction.

I have been working for over a year in the attempt to produce erosion artificially by applying dilute organic acids to the teeth and brushing them alternately. I get, of course, a certain action on the enamel, but when I dry the tooth it looks white and powdery and never perfectly smooth as in erosion. Try putting acid on the enamel and brushing it alternately, then dry it, and you will not have a polished but a chalky and rough surface. Not only that; I have found that acid retards the action of the brush on dentin. If you take a piece of ivory and suspend it in dilute acid or in fermented solutions so that half of the piece is acted upon by the acid, and take it out every day and brush it, using a coarse tooth-powder on the brush, you will find the part of the ivory not acted upon by the acid will brush away more rapidly. That is, the decalcified dentin is brushed away more slowly than the sound. So also is it with all tough, leathery substances; you might grind all day upon a piece of rubber and not grind it away, but a hard brittle substance would be ground away.

I doubt the possibility of a tooth that has become hard subsequently degenerating by internal causes. I believe that a tooth becomes harder with old age, but I am not convinced that it becomes softer.

Dr. M. L. Rhein, New York, N. Y. Mr. Chairman and gentlemen, I think the paper of Dr. Talbot is an important one, for I believe the question which he has brought up is one which has been too much overlooked by the profession since the notable scientific discoveries of Dr. Miller, which have demonstrated so plainly the local and what I should call the exciting cause of caries.

Now, I have not taken Dr. Talbot's paper in exactly the same sense as the other gentlemen have. I do not know whether I judge him rightly or not, but I believe when he refers to the constitutional causes of decay, he means the *predisposing* causes of decay. In other words, a tooth has a natural resistance to the various bacilli in the mouth when the patient is in a state of health, and so great is this resistance that it is impossible for caries to exist. The very cases that have been cited by Dr. Talbot, Professor Miller, and Professor Truman, I will cite to you as evidence in substantiation of the theory brought up by Dr. Talbot. These are cases where fillings have preserved the teeth for a certain length of time, and then when the patient is subjected to some constitutional disturbance we suddenly find the ravages of caries proceeding rapidly. It is not meant by this that the constitutional disturbance is the direct exciting cause, but without this constitutional disturbance as a predisposing cause, the exciting causes—the various bacilli—would be unable to produce their effects.

This is my conception of Dr. Talbot's paper, and I agree with him in this; I go perhaps a little farther: I believe that the various serious constitutional disturbances manifest themselves in the mouth in different ways according to the character of the trouble that is producing the various forms of malnutrition.

I do not want to go extensively into this subject, but my own opinion is that there is a large field open to the profession in this direction. In other words, I believe that the mouth symptoms are very strong indications, if carefully observed, as to what is wrong in the system generally.

As to erosion, I agree thoroughly with Professor Miller and Dr. Talbot in this respect. I do not think that an "acid condition," as we ordinarily speak of it, has anything material to do with it. In all these cases, to a certain extent the conditions found in the oral solutions vary from time to time. They may be acid during one portion of the twenty-four hours and alkaline at another. I believe the point we should consider is that the mucous follicles are in a pathological condition.

The CHAIRMAN. I think it might be better, Dr. Rhein, if you would defer discussing the specific question of erosion until Dr. Ottofy has read his paper on that subject.

Dr. RHEIN. Then I simply want now to call the attention of the section to the distinction which should be made in speaking of this subject between the exciting cause and the predisposing cause. This being understood there will be no difficulty in understanding—as Professor Miller has elucidated—that bacilli may be present and yet caries be an impossibility.

The CHAIRMAN. I would also suggest to Dr. Talbot that it would perhaps be better for us to hear Dr. Ottofy's paper, and then he could close the discussion together with Dr. Ottofy.

Dr. TALBOT. Certainly.

Dr. LOUIS OTTOFY, Manila, P. I., then read his paper entitled "Observations on the Causes of Erosion," as follows:

OBSERVATIONS ON THE CAUSES OF EROSION.

In a brief paper which I presented before the Third International Dental Congress in 1900,* I called attention to a possible cause of erosion—as it was my privilege to observe it—due to the retention in the system of some of the constituents of excreta, or to the introduction of those substances, in a partially fermented or in an unfermented condition, as the result of customs and practices which prevail in the Orient, within my field of observation in China and Japan. At that time my observation on this subject was confined to the people of Japan, natives and foreigners alike. Since that time the views I then formed find additional confirmation as the result of over four years' observation in the Philippine Islands.

"ORIENTAL EROSION."

Common erosion, as it is generally recognized, resulting in the V-shaped destruction as well as the concave form usually recognized by writers on the subject, is in the Orient supplemented by a form which I have no recollection of ever having noticed during my residence in the United States. It consists in some instances in the erosion of the incisal edge of the incisors, while in others I have seen the destruction of the labial surface of incisors, until half of the tooth had been destroyed, the resultant discoloration showing the outline of the enamel, dentin, and calcified obliteration of the pulp-chamber.

In order to insure a better understanding of the subject on the part of those not familiar with the customs of the East, it will be necessary to explain such of the prevailing methods as have a direct bearing on this matter. As is well known, Japan and China support an immense population. As regards China, the indefinite knowledge of the number of her population and the obscurity of

* Third International Dental Congress, Paris, France, 1900. *Comptes rendus*, t. iii, p. 264.

data on the point of her tillable soil makes it impossible to give any reliable information as to the number of people supported by a given space of soil. It is, however, well known that the teeming millions of the Flowery Kingdom use every available acre for the support of her people, and the exportation of farm products which yield better financial remuneration as items of export than as food for home consumption is very meager.

In Japan, as regards statistics it is otherwise. Her population amounts to nearly fifty millions, while the more than six hundred islands of the empire embrace 147,000 square miles, or "equal to the single state of Montana," and "of this less than 19,000 square miles are arable land. If all the tillable acres of Japan were merged into one field, a man in an automobile, traveling at the rate of fifty miles an hour, could skirt the entire perimeter of arable Japan in eleven hours."* These few acres not only feed a population of nearly fifty millions, or more than half of the population of the United States, but, while Japan also exports foodstuffs such as rice, potatoes, onions, etc., its combined imports of food and fertilizers more than balance the sum total of the exports. Hence it is safe to assert that nearly fifty million people receive sustenance from territory no larger than the states of New Hampshire and Vermont. This necessity of overworking the soil has resulted in the exhaustion of its productive virtues, which in turn has led to the necessity of free and extensive fertilization. By reason of the scarcity of domestic animals, such as horses and cattle, due in fact to the greater value of the limited soil for the production of food for man rather than for grain and forage animals, leading to an absence of manure for fertilization, the excreta of the alimentary canal and the secretion of the kidneys of man—which in less populous countries finds its way into the depths of the soil and the rivers and streams—assumes in Japan and China extensive value as a fertilizer.

In these countries, therefore—excepting limited foreign communities and modern buildings in large cities—all excreta and urine is carefully collected and transported to the farming lands. To see this custom among the Japanese it is only necessary to live in a city like Yokohama or Tokio. In the former, beginning at about 5 A.M. daily, the principal roads leading to the country are teeming with men and women with bamboo poles over their shoulders, carrying a wooden bucket of excreta at each end; others are pulling carts containing four, six, eight, and more of the same kind of vessels, women and children pushing the carts, while here and there a native pony or a specimen of a diminutive species of bull carries two or four buckets on his back, all hastening to the farms. There the products are stored in large tanks and barrels buried in the ground and used as occasion requires for the fertilization of rice fields, vegetable gardens, and indeed for the support of all useful vegetation. In thinly populated sections these excrements often have to be brought some distance from more thickly populated centers, and the quantity is frequently so limited and the demand so great that it has to be used at times before the processes of fermentation are more than partially completed. In other words, vegetation is forced to its utmost capacity with human excrement and urine almost immediately after the same has been voided from the human system.

That this practice is deleterious has been recognized by the agricultural scientists of Japan. The writer just quoted has the following to say on this point:

"The secret of the agricultural success of Japan has been a mystery to many students of nations. Progressive experts of high authority throughout the Occident now admit that in all the annals of agriculture there is nothing that ever approached the scientific skill of Japanese husbandry. Although the United States has extensive experimental farms—the Arlington station at the national capital alone comprising five hundred acres—

* Harold Bolce, in August 1904 issue of the *Booklovers' Magazine.*

and although our Department of Agriculture includes a corps of skilled and successful investigators, some of them enjoying international repute, the American government has turned for instruction in a number of essential principles to tiny experimental patches in Japan, where native scientists studying agricultural problems through the lenses of the microscope are making discoveries of world-wide importance. Our experimental farms number fifty-six; Japan has nearly two hundred. Yet the combined area of those island stations is not equal to the single farm America maintains at Washington. The main experimental station in Japan is regarded in that country as a very big affair. Big it is in importance—and, from the Japanese standpoint, extensive in area. It is located in the suburbs of Tokio, and comprises a trifle less than six acres.

"On this small field Japanese scientists are wresting from the soil and from the vegetable kingdom secrets utterly unknown to western nations. American and European agricultural explorers have sought repeatedly to get facts in regard to the achievements of these Japanese investigators. But the Japanese government does not wish the West to share the fruits of its advanced researches. So pronounced is the opposition that an eminent American scientist, learning that I was to visit the experimental stations in Japan, invoked my assistance in securing certain information, stating that an effectual embargo had been placed upon his official efforts in that direction. Thus the experimental farms, like the arsenals and harbor fortifications in Japan, have been included in the forbidden."

Mr. Bolce's article, from which the foregoing is quoted, has nothing to say on fertilization with human feces and urine. As his article is for a home journal, all reference to this phase of the subject is excluded. It would be interesting to learn this observer's views on this topic, and he may possibly know whether the more recent scientific investigations have revealed the injurious nature of vegetable growth thus induced, and to what extent, if any, those investigations have either proved or disproved the arguments set forth in this paper.

The diminutive stature of the Japanese race is in a measure attributed to this cause, and is possibly aggravated by the Japanese custom of sitting with the legs folded under the body; this custom, it is claimed, tending to hinder the development of the lower limbs.

Unfortunately, neither chemical analysis nor any other method of investigation will yield up the secret of the difference between rice produced from normally fertile soil by nature's unaided processes and that produced by the aid of artificial fertilization with unfermented human excreta. It is recognized that a difference does exist, and that the result is in favor of the normally produced vegetation.

Crops of garden produce, such as onions, radishes, lettuce, cabbage, tomatoes, etc., are grown in rapid succession in Japan, and in some sections continuously throughout the year. It almost seems that the soil is merely a medium of dilution, and the excrement the source of production. In traveling about the country one can see the farmer in his field with a bucket in one hand and a wooden dipper in the other, fertilizing the rice fields and throwing the material freely over the sprouting vegetables.

While it is generally accepted that plants will select from the soil and from the media into which their roots extend only that which is necessary for the development of each of them, it has also been demonstrated that plant life, not unlike animal life, is susceptible to artificial influences of various nature. Thus, certain coloring matters and volatile substances possessing odor are taken up by plants to which such materials are unnatural, their presence being recognized either by their color or smell. It is therefore possible that substances found in fecal matter the knowledge of whose chemical composition is still more or less shrouded—such as indol, phenol, skatol, etc.—may be taken up by the plant.

I feel more convinced of the probability of some such influence since my

residence in the Philippine Islands. The Japanese and the Filipinos belong to the same race, and their mode of life—in regard to food at any rate—is almost identical, except possibly that in the Philippines even the poorest of the people sometimes add the meat of fowl, hogs, and carabao to the universal diet of rice and fish which is the staple food of both countries.

In Japan, erosion is quite prevalent among the natives, while foreigners are usually affected after long residence in the Islands. Foreigners, in course of time, develop a fondness for rice, which thereafter becomes a constant constituent of their food, as well as the forced vegetables, some of which are raised especially for the consumption of foreign residents. I have seen many persons who have resided for over fifteen years continuously in Japan, and almost without exception the teeth of these foreigners were more or less attacked by erosion. In the case of a gentleman who, some forty years previous to the time I knew him, was instrumental in persuading the Japanese government to open ports for the settlement of foreigners, the condition was unusually well marked. The delicate mission of this gentleman, at a time when open hostilities existed toward all "foreign devils" in Japan, obliged him to assume the garb, follow the life, and eat the food of the Japanese.

It having been recognized that the improper elimination of uric acid leads to certain systemic disturbances, and possibly is a remote or contributory cause of erosion, in like manner it is possible that the introduction of the volatile active principles of the products of decomposition may have some influence in producing this form of erosion, which may aptly be designated "oriental erosion" (*Erosio orientalis*).

On the other hand, the consumption of an unvarying diet, largely vegetable, and produced under the conditions described, may lead to the presence of a superabundance of the volatile products of decomposition and their absorption through the walls of the lower portion of the large intestines, thus forming a constant constituent of the blood supply. That this is true of the action of the kidneys is an established fact; namely, that products of retrograde metamorphosis which should be and are normally eliminated by the kidneys, are, under abnormal conditions (or by the introduction of an overabundance of foodstuffs whose digestion and absorption lead to products eliminated by the kidneys), retained in the circulating medium and eliminated by the salivary and sudorific glands.

"EROSIO ARECA" (BETEL EROSION).

In a paper read before the Manila Medical Society, September 7, 1903, and published in the DENTAL COSMOS for December of the same year, I made brief reference to the recognition of a peculiar form of erosion which I observed among the Filipinos, due to the chewing of the betel nut, which is a common custom of the East, including Japan, China, the Philippines, the archipelago stretching along the Straits Settlements, Burmah, Siam, India, etc. As far as I am able to ascertain, to its use is ascribed a stimulating effect similar to that produced by tobacco. It is said to be an aid to digestion, and the impression prevails that it is a preventive of derangements of the alimentary tract.

The following products enter into the composition of a "chew" of betel: A leaf of the buyo tree (belonging to the *Piper* class), weighing about ten grains; a slice of the areca or betel nut, weighing about twenty grains, and from three to five grains of slaked lime.

The leaves are selected and washed; the lime is placed upon the leaf, and the latter is folded until the result is a ribbon about one-third of an inch in width. The nut is deprived of its outer covering and is cut into disks about one-twelfth inch in thickness; a disk is then surrounded by the folded leaf containing the lime, the ends of the ribbon of leaf being tucked in so as to embrace the disk of areca nut. I was informed by laboring men in Manila that they consume from eight to ten of these potions in the

course of a day, at the cost of about two cents or less of United States currency.

The juice produced by mastication is of a brick-red color, and when expectorated has the appearance of being curdled. It causes a dark-colored incrustation to become firmly deposited on the surfaces of the teeth, which becomes embedded in all crevices, irregularities, or deformities of the enamel, and in so far is a preservative, seeming to impart an appearance of density to the enamel. On the other hand, a recession of the gums takes place after buyo has been used for some years, and the further practice of resting the "quid" in the vestibule of the mouth between the cheeks and molars results in extensive destruction of the soft tissues, absorption of the alveolar process, and loosening and final loss of the teeth. Furthermore, when recession has taken place and the pericementum has become exposed, the discoloration becomes deep-seated and is impossible of removal without injury to the teeth. These are the usual effects upon the teeth and the soft tissues of the mouth.

Pride often leads to the abandonment of the practice, especially in young women, or at least to the removal of the stain and deposit; with resumption of the practice, repetition of attempts to remove the stain, etc. For this purpose a smooth stone resembling sandstone is used, polishing the surfaces of the teeth, resulting in the removal of the enamel. But when this practice has been resorted to it is easily recognized; first, by the fact that the attempt has not been carried as far back as the molars, and secondly by the flattening of the labial surfaces of the teeth from the cervical margin down and including the incisal edge. In other words, the liability to injure the gums, and the impossibility of reaching the cervical margin with a rough stone without injuring the gums, results in leaving a shoulder at that point, but from there on down to the incisal edge the friction is freely exercised, so much so that the incisors at the incisal edge are often very thin, while the canines are brought down to a sharp point. This is simply mechanical abrasion.

Contrariwise, the erosion produced as the result of the use of betel creates a concavity on the labial surfaces of the teeth, the molars included, the incisal edge not being thinned as in those cases where friction is resorted to. Even then I was in doubt, after careful interrogation, as to any effort ever having been made to remove the discoloration—in which case I was under the impression that a more or less careless attempt to remove the stain resulted in causing a concave surface instead of a flat one down to and including the incisal edge. But I have seen the lingual and palatal surfaces of the molars and bicuspids attacked in the same manner, and in positions where it would have been impossible to produce the regular concaving of those surfaces by any mechanical means, unless it were done with a disk or wheel used in a dental engine in the hands of a skilful dentist. I can see no other cause, either in the general health, the food, or the method of living of the Filipinos, to produce this peculiar form of tooth-destruction; and its entire absence in those not addicted to the use of the betel nut leads me to believe that this form of destruction may justly be designated as "betel erosion."

Discussion.

Dr. G. W. Cook, Chicago, Ill. Something like a year ago there were begun in Chicago a series of investigations and observations on erosion. The results of that work we are not at liberty at the present time to detail. But Dr. Rhein, I think, has brought out very forcibly the difference between the active and the predisposing causes not only of tooth-decay, but of all diseases of the human body or of the lower members of the animal kingdom.

There are many considerations in regard to the changes in the metabolic processes of the human body. A chilly wind may produce a marked change in the metabolism of many individuals. Marked differences in metabolic processes have been produced by feeding animals in

different temperatures. We know by experiment that the metabolic changes in the lower forms of life due to changes of environment are of great importance in the study of scientific subjects, and Dr. Ottofy's interesting observations open up a vast field of research. Now these changes, so-called "constitutional," are due to so many phases that it would be impossible and out of place to go into details now. But I do believe that the majority of what we designate as constitutional causes are due to some modification of the nutritive function of the alimentary tract.

Ading and other experimenters have shown that if the intestinal tract be ligated in any part of its course, the absorption and transmigration of bacteria will take place, and pathological excretions will also pass through the walls of the tract. I am therefore inclined to believe from my experience with the cases that have come under my care that nine-tenths—perhaps that figure is high—of all our local conditions usually attributed to constitutional causes are really due to some nutritive error, either over-stimulation or under-stimulation of some portion of the digestive tract. And when changes have taken place in the constitution of the individual necessarily there is a changed condition of the excretions and secretions of the body, both chemically and physically.

This subject of erosion is one that will be divided into a number of classes. I have been very much interested, and I wish to accord to Dr. Miller the greatest possible honor, because I feel he has attached a wire to me that makes me keep at work as soon as I begin to flag. He made a number of important statements in an article published in the Cosmos for March 1904 on the subject of "Erosion." But, in regard to all these conditions, we as dentists must look clearly for the local causes in each particular individual that we are called upon to treat.

Dr. Miller. In the cases mentioned where the calcium carbonate was constantly made use of, the acid would be neutralized thereby, would it not?

Dr. Ottofy. Certainly.

Dr. Miller. I think that that would be a proper deduction. I would also like to ask what the animals eat there, and whether they show erosion also?

Dr. Ottofy. I have not investigated that question.

The Chairman. If there is no other discussion I should like to have Dr. Rhein continue from where I interrupted him.

Dr. Rhein. For many years back I have had the same idea of erosion as that stated by Dr. Ottofy in a very simple sentence: If the kidneys or some other organ of the body do not eliminate a certain amount of material, then the burden may fall—not, as I remember he said, upon the salivary glands; I differ with him there—but upon the mucous follicles, thereby becoming productive of erosion.

His description of the manner of nutrition of the Japanese demonstrates to us the limited variety of their food and the consequent effects which he describes suggest a strong correlative with the disease known as infantile scorbutus. I would like to call your attention for a moment to that disease, which has only been understood during the last fifteen or twenty years. It is intimately related to scurvy, and is produced only when a child is fed upon a certain form of milk which does not bring enough nutritive elements into its system. One of the results is the destruction of the entire enamel matrix of the teeth. The teeth are destroyed through pathological conditions which are clearly discernible in the oral secretions. It struck me that the Japanese form of erosion described in the paper bears a strong relation in that way to infantile scorbutus.

I want to call your attention to another fact. We have heard a great deal during the past few years—and I believe it has been to the advantage of our patients—of the value of the attention which we give, in the preservation of the teeth, to keeping the mouth in a condition that is as near the normal type as possible; that is, to encourage the ab-

solute cleanliness of the mouth, and to teach the patient to maintain it.

My deduction is clinical, but it is well established in my own mind that if the capillary circulation in the mouth be kept in an active condition there will be a resistance to morbid conditions, which will not be able to manifest themselves.

I should like to explain this by stating that in erosion—in progressive erosion, where I am able to realize that the ravages of erosion are going on—I have over and over again stopped that process by the stimulation of the gum tissue about the teeth where the mucous follicles are present in large quantities, and by obtaining as nearly as possible a sterile condition of the mouth. In this treatment I have resorted to various forms of stimulation of the capillaries, such as the orange-stick, or calling to my aid various forms of force—electricity, vigorous massage, etc. That I have been able in this way to stop what I may call progressive erosion gives me reasonable ground to say that the cause of this erosion lies in the fact that there is an elimination through those portals of effete material which, if it were eliminated in some other portion of the system, would not be productive of this result. It is simply this point that I desire to call to your attention. (Applause.)

Dr. Eugene S. Talbot, Chicago, Ill. I was very much pleased by the remarks that were made by Drs. Truman and Miller, and more particularly with the remarks of Drs. Rhein and Cook. I appreciate the points that they made, and I agree with them thoroughly. There is no question in my own mind, and I believe everyone will admit, that the necessary local conditions are friction and acidity. I do not see how there can be anything else. Dentists do not go far enough in any particular medical branch of dentistry.

I do not see how it is possible for a man who has been in perfect health until he is forty-two, and then is taken down with a disease—whether Bright's disease, pneumonia, tuberculosis, or any other disease where the entire system is involved, as a result of local disease—for the teeth to remain perfectly normal. There are periods in the lives of every individual from the time the first teeth erupt until they are lost when they become stronger and harder. Now, if this be true, the reverse must also hold good. If a structure can be built up by the system becoming stronger, necessarily by disease the structure must also become weaker.

We have learned more about the nervous system in the last ten years than before; indeed, all the text-books written on that subject ten years ago are of little account today. Fortunately I was just getting along to the point of studying the nervous system when our new methods and stains came into use. I have traced the relation between the bloodvessels and the nerves, and I have demonstrated—as other scientists have done in the body elsewhere—nerve and pulp degeneration. If other tissues become diseased in this manner, the pulp must also be a most favorable organ for the same process.

What Dr. Ottofy told us was new to me. I believe he has confirmed to a certain extent the views I have stated. I placed the subjects of decay, erosion, abrasion, and discoloration under one head because I believe they are all influenced in the same manner, the only difference being the locality. Each subject is large enough for a paper by itself. I can show many cases in which the color of the teeth has changed, the enamel has softened, and decay has gone on rapidly as the result of a systemic condition. The very beautiful illustration of Dr. Rhein further tends to clear up this subject.

The Chairman. I would like Dr. Eugene S. Talbot of Chicago to take the chair while I take part in the discussion.

Dr. Talbot accordingly then took the chair.

Dr. R. H. Hofheinz. An instance occurring in my practice some seven or eight years ago illustrates the nervous influence in these so-called constitutional cases. I had attended to the teeth

of a lady probably thirty-eight years of age, and at that time I considered her mouth in perfect condition; there was not the first sign of erosion. There had been some decay which was taken care of in the usual way. About six months after that I received a letter from my assistant saying that the patient had called at the office and complained of sensitiveness of her anterior teeth. I wrote my assistant that the patient should consult a certain practitioner known as having great diagnostic abilities. She went to see him accordingly and he said it was a case of erosion. The case continued so far as I can remember for at least seven or eight months more. I wrote to her physician to examine her saliva, and it was found to be strongly acid. I have every reason to know that the patient was at the time under very serious nervous strain, that was all, and her physician wrote me giving the details. It was nothing but a neurasthenic condition, and the erosion lasted about fourteen to sixteen months. I took impressions of the teeth and found that some had eroded fully a millimeter in depth. At the end of that time the neurasthenic condition had ceased, and the erosion ceased with it.

I believe we have so many constitutional factors to consider which may express themselves in local manifestations as has been stated, that we should always look for possible constitutional influences.

Dr. Ottofy is not present, so we cannot have him close the discussion.

On motion, the section then adjourned to meet next day, Tuesday, at 2.30 P.M.

SECOND DAY—TUESDAY, AUGUST 30.

The meeting having been called to order at 2.30 P.M. by the chairman, Dr. Hofheinz, the minutes of the previous meeting were read by the secretary, Dr. Rhein, and approved.

The paper by Dr. SAMUEL A. HOPKINS, Boston, Mass., entitled "Application of the Results of Research Work to Daily Practice" was then read by the secretary, Dr. Rhein, as follows:

RESEARCH WORK AND ITS APPLICATION: THE APPLICATION OF THE RESULTS OF SCIENTIFIC RESEARCH TO PROBLEMS IN DAILY PRACTICE.

In the profession to which we have the honor of belonging we meet with a class of men who boast of the fact that they are practical. These are frequently men of rare manipulative skill and of great mechanical ability, and in a profession calling for the hourly use of marvelous dexterity and in which much of the time is occupied in restoring impaired teeth to usefulness or in replacing lost teeth with artificial substitutes, such men deserve and secure a large measure of success. Too frequently, however, the boast of being eminently practical is but a cloak to cover the inertia or indisposition which renders an individual unable or unwilling to follow the advance of students of science who are laboring unceasingly to thrust the reaping-knife of original investigation into the ripening harvests of human knowledge that surround us.

Those of us whose privilege it is to teach must frequently feel that among the instructors in our dental schools there is a division of taste and interest too marked for the well-being of the school, and a lack of concord which diminishes the force of our instruction, and makes it less readily available for the uses of the student. We frequently have on the one hand an excellent body of intelligent gentlemen teaching operative and mechanical dentistry, orthodontia, and prosthodontia, who have only a rudimentary knowledge of histology, pathology, and bacteriology, and who honestly feel that these and allied sciences have but little bearing on their professional work. Indeed, the very fact that, while they have wilfully ignored these subjects, they have nevertheless achieved success in building up a lucrative practice, is satisfactory evidence to them that such knowledge has no more important bearing upon their professional career than Greek archæology has to the work of an Hibernian laborer.

On the other hand, in many instances

we are forced to depend for our teachers in the scientific branches upon men who have never studied dentistry. They are men of high attainments and are enthusiasts in science, in which they are completely engrossed. They are unable to point out the practical application of their wonderful knowledge to the daily problems arising in dental practice—if, indeed, they have not lost sight of the fact that the chief value of such knowledge lies in its ultimate application. Medical education presents the same picture. Pathology, for instance, was originally studied in order that the observance of morbid processes might lead to the discovery of some means by which the practitioner could thwart the disease which gave rise to such morbid conditions. Today pathology is studied for the sake of pathology, and its application to the needs of the practitioner is a secondary consideration—if it be not entirely lost sight of. Indeed, I recently heard a professor of this science in one of our great medical schools declare that the application of his work was never thought of, and that he preferred men as his assistants who had no knowledge of the practice of medicine.

Such an attitude as this on the part of a teacher in our medical or dental schools might easily tend to stultify any interest which the student might have developed in the study of the biological sciences, if such interest depended upon the application of his studies to the practice of his profession. The value of research work cannot, however, be estimated by the use which immediately follows its announcement. Indeed, it is highly probable that so far as the ultimate benefit to mankind may be considered, the position of the eminent pathologist to whom I referred is the best one that can be chosen; for it is quite conceivable that if a worker in the untilled fields of science should be oppressed with the nagging necessity of connecting all his results with some practical affair of daily life, his mental horizon would be wofully narrowed, and his limitations would be so great as to render much of his work ineffective. In our great anxiety for results, we are prone to lose sight of the fact that the very spirit which spurs a man on to profound investigation may chafe at the suggestion of the utilitarian who insists upon seeing a prompt application of every recorded fact of science. The study of science for science' sake is quite as inspiring to many minds as the study of science for its immediate bearing upon the problems of life. It must not be forgotten, however, that the storing up of scientific results could hardly be carried on with the enthusiasm which inevitably accompanies such work, were it not for the confident assurance that the time would eventually come when such results would be available for the needs of humanity.

A striking illustration of this principle may be found in the fact that the laying of the Atlantic cable was made possible by a mathematical formula worked out nearly half a century before transatlantic communication was thought of, and which had had no practical application until the problem of bringing the two worlds into daily communication with each other was suggested. It was then that Sir William Thompson, now Lord Kelvin, remembered the experiments of the French mathematician Fournier in measuring the rapidity with which heat travels along an iron bar. By the application of Fournier's formula to the great electrical problem which then engaged the attention of both countries, Sir William Thompson was able to assure the capitalists who sought his advice that a cable built according to the plans he indicated would be a positive success. The world has seen the vindication of Lord Kelvin's prophecy, and has had reason to be grateful to Fournier for recording a scientific fact that for many years had, seemingly, no practical application to the affairs of life.

For many generations chemistry has been storing up facts the application of which, in many instances, was extremely problematical. Physiology began to advance, and to avail itself of the results of chemical experimentation—of results

which, in many instances, had been hitherto unavailable for any useful purpose. This union has resulted in the wonderful science of physiological chemistry, which already has delved deeply into the problems of vital existence, and which gives promise of leading us to the very boundary line of human knowledge, where the material facts of human life and human thought become merged in the unfathomable mystery of the spiritual. Instances are not wanting in medical and dental science wherein the investigations of scientists have been immediately followed by the discovery of a method of preventing or successfully controlling disease. Indeed, it may be confidently asserted that every advance from empiricism has come as a result of scientific investigation; and the most self-centered, avaricious seeker after commercial success will welcome with enthusiasm any scientific advance which simplifies his work or gives promise of increasing his income. It is, however, the other class of scientific work—that which is not immediately productive of utilitarian results—which is also worthy of our attention, for which I am now pleading. Research work which has no immediate application to the needs of the world may fail to hold the attention or to excite the applause of the average man of affairs who prides himself on being practical. Yet this same work may still be of utmost value in pointing out the road, and in clearing the way for some other investigator, who, with the start thus given, may successfully solve an important problem and reveal its bearing upon the world's work.

Indeed, if time allowed it would not be difficult to show that almost every piece of research work that has been of value in its application to human needs has had its inspiration in some other work which may perhaps have fallen far short of the practical requirements of mankind. To awaken an interest in science for its own sake in our profession would be to awaken a broader intelligence, to give birth to new and better ideals, and to break the fetters of concentrated application to routine duties which make dentistry the most exacting and narrowing of the professions. Without decrying the necessity of discussing everything that has a bearing on the successful filling of a tooth-cavity, I would suggest that a too frequent repetition of the old formulæ may narrow our intellectual horizon and dull our perceptions; and when such discussion degenerates to the point of recalling the mythical experiences of the Dumas of our profession, our politeness is taxed unfairly, and our time is unjustly wasted. Our politeness is taxed, because when a man recites successful operations performed by him, with the implied meaning that he alone could have performed them, and relates the marvelous cures that take place under his skilful treatment, we are all convinced that the speaker is romancing, but courtesy prevents our saying so, and indeed there is no way of proving the falsity of his statements. Upon the younger men the effect is discouraging, for they know that they themselves cannot achieve the exalted standard of skill claimed by such a speaker, and they have not learned to discount his claims. For these reasons I would plead that clinical work be performed at the proper clinic, and not in the imagination of those rhetorical romancers who mistake the courteous silence of society members for credulous belief in their impossible tales.

I would plead, too, for an interest in subjects not directly applicable to the daily operations of our profession, because such subjects broaden our viewpoint and develop a sense of values which the too constant riveting of our attention upon the point of an instrument is apt to destroy.

With this preface, and with an apology for bringing to your notice some unfinished work—and work which may be said to be unsuccessful in the fact that it has neither fulfilled my expectations nor revealed a field of application—I will call your attention to certain mouth bacteria which have the interesting property of producing mucin, and which may be found, on further investigation, to bear a causal relation to cer-

tain pathological conditions which we are repeatedly called upon to treat.

Mucin is a nitrogenous matter found in several of the tissues of the body, and notably in connective tissue. It is also found in several secretions of the human body, and in certain secretions of animals belonging to different species. It is, as you know, found in mucus, and its viscid consistence is so well known that it is scarcely necessary to dwell upon it. The fact that bacteria are capable of producing a gelatinous substance has been demonstrated by a number of bacteriologists, and both Dr. Black and Dr. Williams some years ago pointed out very clearly the association of this gelatinous substance with caries. And in this connection it is well to remember that all slimy products of bacterial activity are not necessarily mucin, and at the same time it will be well to remember that the production of mucin is not confined to a single species of bacteria. We have known for many years that even macroscopically, salivas of different individuals differ greatly, and we know also that the saliva of the same individual differs at different times and under different conditions of health. We have come to associate the stringy mucus-laden saliva with rapid carious action; and we have speculated as to the reason for this condition without receiving a satisfactory answer, except such as is found in the mechanical binding of the lactic acid-producing forms to the dental enamel walls by the gelatinous mass. Those who have never made the tests would be somewhat surprised to find that this ropy saliva is usually quite alkaline in its reaction, and that in a majority of instances there is a copious flow, and that this flow sometimes becomes very excessive.

If we should carry our observations still farther, we would discover that this stringy saliva is a far better medium for the cultivation of bacteria than is a clear watery saliva, particularly if that thin, watery saliva be slightly acid in its reaction. In other words, bacteria multiply very much more rapidly in the thick, mucus-laden saliva which has marked alkaline reaction, than in the clear, watery product which has a neutral or a slightly acid reaction. An acid reaction retards bacterial growth, and is not usually associated with excessive carious action.

If we go still farther, and cause our patients to follow the Fletcher method of excessive mastication, we shall notice that the saliva undergoes a change, and that which was thick and stringy becomes much more clear, and is a less suitable medium for bacterial activity. This would indicate that the salivary glands, if stimulated in a normal way by proper mastication, are often capable of pouring out a perfectly healthy normal product in response to normal stimulus. An interesting problem in cytology is here suggested, which time will not permit me to discuss, but the fact may be regarded as established that healthy normal exercise produces healthy cell action resulting in healthy secretion. If we carried our observations still farther we might notice other peculiarities of the patients who secrete this ropy saliva which I have described. We would be apt to notice that these are patients who eat rapidly and who do little chewing, and that they belong usually to that type which we call nervous; but for our present purposes these observations are unimportant.

It has long been known that bacteria break up chemical compounds into simple elements, which unite to form other compounds which are frequently simpler and more stable than the original combination. We have come to regard this property which bacteria have of producing fermentation as being their special function, and we know that life itself depends upon it.

The refuse matter of the earth is decomposed and changed into suitable food for plant life by the action of these microscopic allies of humanity. In the human body proteids are split up into gastric digestive products by their action. Sugars are split up, and a number of acids such as acetic, butyric, formic, and lactic, are produced. Starches may be changed to sugars and fats split up into fatty acids and glycerin by the agency

of bacteria; and it may be reasonably questioned whether life will not become extinct when the antiseptic which will sterilize the alimentary tract has been devised. It has been pointed out by Dr. Miller that the production of lactic acid in the human mouth cannot easily be carried beyond three-fourths of one per cent. because of the destruction of the lactic acid bacteria by the lactic acid which they produce, so that in all experiments on the destruction of teeth by acids we must take into account that the acid which produces the pathological changes in the teeth never reaches the strength of one per cent. Many bacteria are, in another way, victims of their own industry because they have the property of producing enzymes which are capable of digesting the organism which produces them, and sometimes other organisms as well.

I am fully convinced that upon this phenomenon will be found to rest the explanation of immunity from disease, and that the self-limitation of infectious disease finds an explanation in this theory.

If one of the pyogenic or pus-producing forms like B. pyocyaneus be grown for several days at the body temperature, there will be found a scum on the surface of the bouillon. If the tube be thoroughly shaken, and again placed in the incubator, at the end of three days a new scum will have formed. Repeating this operation each third day for about three weeks you will find a deposit in the tube of broken-down bacteria which fail to take the stain readily. Emmerich and Low explain this change by the development of an enzyme which first agglutinates and then destroys the bacteria. The bacteriolytic action is, according to Vaughan, the result of a digestive action upon the nucleo-proteids of the bacterial cell. There is some evidence that in the human mouth, which is never free from bacteria, enzymes may be formed which retard pathogenic activity, and it is not beyond the range of possibility that in the large number and variety of bacterial activity may be found compensating ferments which impose limitations upon the work of those bacteria that we have come to look upon as destructive to the teeth and to the health of our patients.

Mucin production is not limited to a particular mouth-bacterium. A number of forms, B. subtilis, B. coli commune, B. megatherium, and others, have the property of producing this substance. It is interesting to note that the many lactic acid-producing forms found in the mouth are not particularly active in the production of mucin, and this is a point to which I wish to call attention. While many of the lactic acid bacteria are capable of producing mucin, when not engaged in the production of lactic acid—that is to say, when growing in a medium free from carbohydrates—these same organisms in the presence of carbohydrates will produce lactic acid, and their mucin production will be reduced, if not entirely checked. An organism carefully studied by E. K. Dunham of New York produces mucin in large quantities in milk cultures, but does not coagulate the casein, at least for several days, and the whey becomes so slightly acid as to be hardly noticeable. Another peculiarity of mucin production to which attention was called by Leo F. Rettger, of the Sheffield Laboratory, Yale University, was that bouillon cultures became very slimy at a very early date; but while this ropiness was very well marked, the mucin was difficult to separate. At a later date, when the ropiness had in a measure disappeared, the mucin was more easily precipitated. This mucin, you will understand, is precipitated by weak acids. He later accounts for this by stating that, as the culture grows older, a gradual production of alkali in the fluid increases the solubility of the mucin, and in this way the liquid is rendered less slimy.

It has been my hope to point out in some definite manner the part which mucin plays in the destructive changes known as dental caries, but further investigation is needed to show in the complicated bacterial life of the oral cavity how important a factor mucin production is.

CONCLUSIONS.

To sum up, it may be said that mucin may be produced in the mouth by a variety of bacteria; just how large a number have this property is not yet known.

A mucin-laden saliva is favorable to the multiplication of bacteria, as is also an alkaline reaction.

Prolonged mastication tends to free the mouth from mucin, and stimulates the glands to healthy action. Acid-producing bacteria have, in some instances, the power of producing mucin, when not engaged in the production of lactic acid; but the medium favorable for the production of acid is unfavorable to the production of mucin.

Enzymes are undoubtedly produced by the action of the bacteria which produce mucin, but the effect of the enzymes is not yet known.

Discussion.

Dr. E. S. TALBOT, Chicago, Ill. I appreciate the first part of the paper which has just been read more than I do the last part. Dr. Miller also will appreciate the fact that scientists who undertake research work are at the disadvantage of not being able to bring before the profession their ideas as a whole in a manner sufficiently lucid to be understood by everyone. Aristotle, four hundred years before Christ, laid down some laws which are only now being accepted and appreciated by humanity. The scientist doing research work now, as Dr. Miller is, will be glad if in the next one or two thousand years his ideas are fully understood.

The dental profession is young—only sixty-four years old. It was a very good thing that the dental specialty started off at a tangent from the medical profession. The practice of dentistry is widely different from the practice of medicine, and this difference makes it necessary that dentists should take up the mechanical side and perfect it. Had dentists been educated with the medical profession it is doubtful if there would be as good operators as there are today. But, like all mechanics, mechanical dentistry has virtually reached its highest development. Very little that is new and substantial occurs along the line of mechanics at the present time. I question if mechanical dentistry will improve in the coming time to the same extent as it has in the last few years. Dentistry has now come to the cross roads, hence the medical side of dentistry must now be developed. As the essayist has said, dentists are taking up the scientific side of dentistry all over the world, and I am sure that further progress must be along medical lines.

The last part of the paper I cannot discuss, because it deals with original work, and I have never undertaken that part of the work.

The CHAIRMAN. We will defer further discussion of this subject, as Dr. G. W. Cook, Chicago, Ill., will now read a paper on a related subject, and we can discuss the two papers together, after Dr. Miller has read his summary of the paper by Dr. Römer on "Alveolar Pyorrhea."

Dr. GEO. W. COOK, Chicago, Ill., then read the following paper:

THE EFFECTS OF CHEMICAL AGENTS ON BACTERIA WITH RELATION TO THE SALIVA.

In the study of the effects of chemical agents on bacterial protoplasm there are three phenomena to be considered. First, the effects of various chemical elements upon the chemical composition of living protoplasm as manifested in the modification of metabolic processes; second, the phenomenon of living protoplasm to adapt itself to chemical elements; third, the effect chemical agents display in directing protoplasmic movement (chemiotaxis).

As understood at the present time the phenomenon of cellular activities is but a chemical change taking place in a highly complex and very unstable molecular substance, and in the living state is readily acted upon by four main groups of protoplasmic poisons, which have been classed as follows: The oxidizing agents or poisons; the salt-forming agents or

poisons; the substitution poisons, and the catalytic poisons.

By an oxidizing agent we mean an agent containing active oxygen which readily attacks protoplasm when brought in accessible relation to it. The second group, the so-called salt-forming poisons, are those acids or bases that enter into chemical relations with the proteid substance in the protoplasm. A chemical change is largely influenced by the quality of the proteid molecule. A number of observers have noted the fact that acids or bases will not act as readily on such proteids as keratin, fibrin, and chitin, whilst many other proteids react quickly to acids and bases.

The third kind of poisons are classed under "substitution poisons" and are grouped under two heads, the sulfur compounds and the nitrogenous substances. These have been classed by Lowe among the ketons, aldehyds, and amido groups. The majority of these compounds do not act chemically upon albumin in the lifeless state, but they act as a very violent poison on living protoplasm, which indicates that such chemical agents have a very unstable molecular grouping. The majority of the molecules, chemically speaking, are closed chains, and the poisonous effect is usually in proportion to the number of hydrogen atoms in the molecule, and their being so combined as to give up the hydrogen, which unites with the nitrogen in the living protoplasm, so as to substitute hydrogen instead of some other chemical element in the proteid molecule. These facts have been clearly worked out by Locke, Lowe, Binz, and a great many others.

The fourth group of protoplasmic poisons are usually designated as the catalytic poisons. Their action on unicellular organisms is that of anesthesia. They are composed very largely of organic compounds of the fat series, and are usually endowed with but little chemical energy. The complexity and instability of their molecular composition is the basis of their poisonous action, and when CH_3 or C_2H_5 is added, making an alkali, the poisonous effects are increased; and as the atoms in the alkaline media are increased, so are its poisonous effects. This is also true in the methane series and sulfuretted compounds. If chlorin takes the place of hydrogen in the methane molecule, its poisonous effects are considerably increased.

The study of the action of certain chemical elements upon protoplasm, as represented in the unicellular organism, has added considerably to the knowledge of the physical and chemical properties of living protoplasm; and investigation along these lines has demonstrated that all protoplasm is not the same in its general chemical constituents. It further shows that all atoms in the protoplasmic body are not always essential to the life of the protoplasm, thus demonstrating that protoplasm is dissimilar in different organisms. Scientific investigation along these lines has further shown that it is possible to treat a protoplasmic body with a weak solution of a chemical agent and gradually change the composition of the organism so as to render it incapable of being perceptibly injured by a much stronger solution of the same chemical agent than would have been necessary to destroy its vital activity previous to the first treatment. The investigations on protista, by Davenport and others, have led many to the conclusion that the altered chemical constituents of the protoplasmic body will be transmitted in the division of the individual organism, and that the composition of the cellular protoplasm of the race is largely in accordance with the media in which the previous generation had lived.

In the consideration of what reagents act upon the elementary vital functions of protoplasm, there are a number of things to be taken into consideration; for instance, the supply of oxygen—for it is a well-established fact that the vital activity of protoplasm cannot survive for any great length of time in the absence of oxygen. An exception to this is the anaerobic bacteria, some of which are immediately destroyed in the presence of free oxygen. But it must be borne in mind that in the absence of free oxygen they obtain their oxygen from the break-

ing down of oxygen-containing molecules, and in this way obtain the oxygen necessary to enable them to carry on their nutritive function.

It has been determined that certain forms of the unicellular organisms are detrimentally affected when the oxygen supply is diminished. Clark and Demoor demonstrated that the protoplasm of plasmodia myxomycetes and various tissue cells must have a pressure of oxygen ranging from 1 mm. to 3 mm., and when the quantity was diminished below these points protoplasmic movements were reduced in accordance with the diminished quantity of oxygen. When the organism was held in a 0.1 or normal salt solution for from two to three hours it became inactive, and the cells showed a granular appearance, but when the normal quantity of oxygen was again applied cellular activity was re-established —thus showing that death had not occurred in the cell, but that the organism was capable of re-establishing its cellular activity and carrying on all the functions of life.

The increase of oxygen above the normal quantity accelerates the protoplasmic activity of the cell, which causes it to assume just the opposite action to that which takes place when the amount of oxygen is diminished (Demoor and Rossbach). So it will be readily observed that the poisonous effects of any chemical agent must necessarily be materially influenced by the quantity of oxygen present in the environment in which the organism is living. Not only is the organism detrimentally affected by these chemical poisons, but protoplasmic activity of the organism may be materially increased or decreased in relation to the quantities of certain physiological elements which may be present in its nutritive media.

Ozone (O_3) is extremely destructive to bacteria in water, provided the water be free from organic substances, otherwise it kills bacteria only in proportion to the organic compounds contained in the water and the quantity of ozone that is liberated in the water containing the bacteria. Its effects on dry substances containing bacteria are very feeble.

Hydrogen has very deleterious effects on unicellular organisms; for instance, the amœba, when in the presence of hydrogen for twenty-four hours became spherical in shape and very inactive. The same was true of the myxomycetes. These cells became granular when exposed to hydrogen for forty minutes, and all cellular movements were completely suspended when the exposure was continued for a longer period. Certain motile bacteria were subjected to the same test, and, while some required more than forty minutes' exposure before becoming motionless, others lost their activity when exposed for only twenty minutes.

After considerable study the following conclusion was reached: that the difference in the time of exposure required to cause these organisms to lose their power of mobility was mainly due to the kind of media in which the organism had previously lived. The experiments with oxygen and hydrogen fully confirmed the ideas held by Boer and others, that protoplasm differs both quantitatively and qualitatively. Since all activities of protoplasm must take place almost entirely in water, the reagents tested were capable of absorption in water.

The bacteria used in the experiments were: Diphtheritic bacillus, typhoid bacillus, glanders bacillus, cholera bacillus, B. mycoides.

All agents acted more energetically when the oxygen pressure was reduced slightly below the normal, except the so-called oxidizing agents, and these acted more efficiently when oxygen pressure was increased; for instance, when oxygen pressure had been carried to the limit of protoplasmic endurance and hydrogen peroxid (H_2O_2) was added, the life of the cell was quickly destroyed. The oxids of carbon CO_2 and CO have dissimilar effects on different bacteria. The presence in solutions of the oxids of carbon compounds have a slight influence on the death of bacteria when used in connection with other agents. If CO_2 or CO be added to other chemical agents, they materially assist in causing immobility and final destruction of the bac-

terial cell in from twenty to sixty minutes. However, it must be borne in mind that the carbon oxids have far less influence on the physical and chemical constituents of bacterial protoplasm than they do on many of the other forms of unicellular organisms; and that they have a different action on the protoplasm of different bacteria is a fact well demonstrated by Demoor.

The presence of ammonia in solutions influences the mobility of bacterial protoplasm by first increasing and finally diminishing the movements, until the organism is at perfect rest. The immobility does not signify that the life of the protoplasm has been destroyed, but it has only assumed a state of anesthesia. These poisons, as was previously stated, are classed as catalytic. There is, however, a certain compound which is neither acid nor basic, and which possesses but little chemical energy, that influences bacterial movements very much in the same way as do the ammonia compounds. Most prominent among these are chloroform, chloral, methyl alcohol, carbon disulfid, etc. Nagel's theory is that these poisons act upon protoplasm because of the unstable condition of the molecule in the chemical agent and the reactivity of the protoplasmic substance to such agents. It must be borne in mind that these agents act by anesthetizing the protoplasmic movements, and as the quantity of the agent is increased it continues to act until the reactivity of the protoplasm becomes entirely arrested. This has been designated by some as the law of relation between molecular composition and strength of action.

In the methane series the poisonous action is increased by the addition of carbon atoms to the molecule up to a certain point; then the molecular compound becomes more stable, consequently its influence upon protoplasm is comparatively indifferent. However, if the hydrogen atoms in the molecule be replaced with chlorin atoms, the poisonous properties are materially increased.

The action of the various alcoholic compounds on unicellular protoplasm demonstrates that the action is modified by the chemical constituents of the molecule in the alcohol; for instance, methyl alcohol (CH_3OH) has a weak action; the ethyl alcohol (C_2H_5OH) has somewhat increased poisonous effects; while the isopropyl alcohol (C_3H_7OH) is a very active poison. The action of these three agents becomes more detrimental as the carbon compound in the molecular substance is increased.

When many of these agents were confined to the saliva as a solvent medium, the influence on bacteria was changed in their general constituents more than when they were in simple solutions in water. This can be accounted for only in two ways; the difference in the density of the medium and the poisonous effects of the agents themselves. When bacteria are confined to the saliva as an habitual medium, the phenomenon of osmosis plays an important part in the organic constituents of protoplasm.

The quantitative determination of the osmotic pressure of saliva was determined by the method employed by Pfeffer, and it was found that there was a variation in the osmotic pressure of saliva obtained from different sources; and it was found that in saliva, when the tension fell below 6 atmospheric pressure the bacteria changed in their morphological appearance, assuming a form many times smaller than the original cell. When a solution of the above-named alcohols was added, death of the bacteria took place in from one to three hours earlier than the same solution would produce under normal osmotic tension. This was also true of many other solutions that did not contain the alcohols above named, but in their stead chloral hydrate, chloroform, and sulfonal. The same was true when the tension of the saliva was raised above 7 atmospheric pressure. The higher the tension of the saliva the more deleterious were the effects produced by the agents. When the tension of the solution remained from $5\frac{1}{2}$ to $7\frac{1}{2}$ atmospheric pressure, the bacteria had far more ability to withstand many of the poisonous agents than when the atmospheric pressure was reduced below these points.

The carbon oxids, which are almost constantly present in saliva, seemingly influenced the action of many agents that were tested for their poisonous effects. The tension pressure of osmosis in saliva is materially influenced by the presence or the introduction of free oxygen in the solution. It is also a well-known fact that salts of dissimilar structure have different osmotic pressures even when the molecules in both solutions are the same. This would indicate that potassium, sodium, calcium, etc., have an important influence on the osmotic pressure, as was manifested in various solutions. A 0.5 per cent. solution of the following agents: potassium, sodium, lithium, ammonium, calcium, strontium, barium, magnesium—and especially the chlorids of these compounds—were found to have beneficial influence on the growth of bacteria, but if the quantity of these salts were increased above 1 per cent. certain of the bacteria were both physically and chemically changed, while other forms of bacteria would carry on all the functions of life in apparently a normal way; but when the tension of the solution was changed, or some other chemical agent was introduced into the solution, they became materially affected. This would indicate that the addition of metal ions introduced into a solution increases irritability in the protoplasm of the cell without changing the morphological appearance to any great extent. On the other hand, it was easy to demonstrate that if the quantity of metal ions was diminished below 0.5 per cent. the irritability of the protoplasm was diminished, as was also its power of resistance.

Tests were made to determine the difference, if any, between the action of solutions of the heavy metals on the growth of bacteria in bouillon and in saliva. And in this connection it might be well to state that there is a wide range of variation in the action of the salts of the heavy metals on bacteria when grown in saliva. A solution of these compounds that would affect the same quantity of bacteria growing in bouillon, in a great many instances, would have but little effect on the same organism growing in saliva. There was an indication, however, that the saliva was more easily decomposed; in other words, it seemed to be more unstable in its molecular composition than the bouillon, although there is a great difference in the osmotic pressure of saliva and bouillon.

However, the soluble inorganic compounds in saliva cannot be exclusively taken into account for the changes that sometimes take place in salivary secretion; for it has been found that by preparing a solution containing all the constituents of saliva, as estimated by various authors, there was some difference between the morphological and pathogenic properties of some of the organisms grown in the artificially prepared saliva and that which was obtained from the human individuals. It was also found that certain poisonous agents introduced into both the artificially prepared saliva and the natural saliva differed very materially in their effects upon certain bacteria. This indicated that, in some of its characteristics, an artificially prepared saliva differs from the normal saliva. The saliva, however, obtained from one individual gave a growth of bacteria that answered pretty closely to the artificially prepared solution.

Of course, it must be borne in mind that there are certain soluble organic substances in natural saliva that must necessarily differ somewhat in different individuals. B. pyocyaneus formed pigment in the saliva of eight persons out of ten, yet at no time were we able to produce the characteristic coloring matter of this organism in the saliva of the two remaining persons; but the characteristic pigment was produced in the artificial solution. If asparagin were added to the artificial solution the peculiar pigmentation was produced in great abundance. It was also found that potassium sulfocyanid seemed to play some rôle in the number and pigmentation of bacteria of both the artificially prepared saliva and that obtained from natural sources. This indicates that the cyanogen compounds play some part in the growth found in certain chemical solutions; and that bacteria differ in

their reactivity to the agent, this depending upon the micro-organism used. it is important to bear in mind a well-known experimental fact, previously mentioned, that all living protoplasm is influenced in its life-processes by the media in which it has previously lived.

We have called attention to the oxygen pressure as well as that of hydrogen —two chemical elements that play an important part in the physiological function of protoplasm whether it be in the unicellular or in the multicellular organism. But one of the most important features as regards the life and functional activity of bacteria relates to the mineral constituents of the media in which they grow; for it has been recognized by Vaughan and others that these inorganic salts play an important part in the life of the micro-organism, and the change in the tension of the solution may cause plasmolysis of the bacteria, or alter its chemical constituents. We proved in our experiments that a hypotonic or a hypertonic solution leads to a greater or less degree of injury to the bacterial cell—a phenomenon that has for a long time been recognized. Therefore, a colloidal solution like the saliva, having the inorganic salts enumerated in the list here following would be considered isotonic to the cell wall in the case of most bacteria. But it is a demonstrated fact that the mineral constituents of the saliva have a variation of more than two per cent. in different individuals. Most of the salts exist as chlorids—although the phosphates and carbonates of calcium and magnesium are held in solution by the carbonic acid gas of the saliva:

Potassium	457.2
Sodium	95.9
Iron oxid	50.11
Magnesium oxid	1.53
Sulfuric acid (as SO_3)	63.8
Phosphoric acid (as P_2O_5)	188.48
Chlorids	183.52

And in this solution there are to be found the following organic compounds:

Mucus and epithelium	2.13	1.3	2.2
Soluble organic matter	1.42	3.8	1.4
Potassium sulfocyanid	0.10	..	0.04

The above-named substances are apparently constant constituents of the saliva. Other substances which are not normal, but traces of which are occasionally found, are urea, cholesterin, lecithin, and leucin. Traces of uric acid, biliary pigments, and sugar have occasionally been found; carbon dioxid is present in a gaseous state. All of these substances have more or less influence on the vital activity of bacteria, but with all of them we were unable to account for many of the phenomena that characterized the changes in the products of bacteria—such as toxins and acids produced or not as the case might be.

We then took up a course of experiments which we hoped might lead to something more definite as regards the changes taking place in bacteria growing in saliva. The phenomena of pleomorphism, as well as the pathogenic or the acid-producing powers of the organisms, could not always be accounted for, for the solution seemed to have a bacteriolytic action when it was minus many of the products that have a deleterious influence on the growth of bacteria; and when the osmotic pressure of the saliva was at a point where growth of the organism seemed to be about normal, the osmotic pressure was at a point ranging from 5 to 7 osmotic pressure.

The experiments that followed in the line leading to the determination as to whether or not saliva was capable of carrying from the blood bacteriolysins or antitoxic substances lead so far into the subject that it would be quite out of place to attempt to detail the methods adopted, and under what circumstances it is possible for such substances to appear in salivary secretions. Miller and Hugenschmidt are the first to suggest, or even attempt, any explanation along this line.

However, in 1881, Gautier found that the human saliva contained leucomains, which differ very much in their actions according to their time of secretion and the gland from which they were secreted. He at that time found that saliva contained a poisonous or narcotic substance which when injected into birds showed

characteristic symptoms which indicated that the saliva contained a poisonous agent that could by certain chemical manipulations be obtained from that solution. We followed this author's experiments and obtained similar results; we also carried it farther, by trying the saliva that had been freed from its normal inorganic salts as well as bacterial organisms, and testing it in solutions containing various bacteria. On a number of these organisms there seemed to be but little appreciable disturbance; however, with such forms of bacteria as the diphtheritic, typhoid, and B. mycoides, in the saliva of three persons out of ten there was found a bacteriolytic substance. For certain micro-organisms grown in saliva that was tested it proved to be isotonic. When saliva that had been freed from its inorganic salts by dialyzation was placed in solutions containing these organisms, in the saliva of the above individuals there was found to be a feeble bacteriolytic action. It must be borne in mind that these bacteriolytic complements did not destroy the bacteria at once, but when they lived for an indefinite time in the saliva containing these bacteriolytic bodies the organisms became distorted, losing their morphological appearance and also their power of producing disease; and if kept long enough in the presence of these solutions the bacilli would assume almost a coccus form and eventually die. When a number of organisms were placed together in the solution, certain forms seemed to succumb to the action of the solution much more quickly than when they were placed under its influence in pure cultures. This would frequently happen, however, if the cultures were mixed in any media, but not so quickly as when in the solution of the saliva of the three individuals mentioned.

It is to be very much regretted that the methods employed in this experimental work could not be mentioned more in detail, but time and space would not permit. This work has led to the conclusion that the various agents that may be present in the saliva as a normal constituent, or those that may exist there as a foreign substance, have great influence on the growth and on the physiological activity of bacteria in general. It is also an evident fact that saliva will influence the pathogenic properties and the acid-producing powers of certain forms of bacteria. It also demonstrated that bacteria have the power of acclimating the organism to its environing conditions, and that this is manifested by the modification of metabolic processes, and by the movement of certain motile forms of bacteria. It also showed that a change in the physiological activity of the human individual would manifest itself in the saliva and its action on bacteria. The hope of obtaining a chemical agent that will act as an antiseptic in the oral cavity is not to be expected with any degree of assurance. All that need be expected is the mechanical removal of the bacteria present by such solutions.

Dr. W. D. Miller of Berlin, Ger., then read a summary of the paper on "Alveolar Pyorrhea," submitted by Dr. Oskar Römer, Strasburg, Ger., as follows:

Alveolar Pyorrhea.*

The author says that all noxious agents which produce an inflammatory process in the gums may lead in case of continued action to pyorrhea alveolaris as soon as the equilibrium between the vital energy of the cells and the aggressive energy of micro-organisms is disturbed in favor of the latter. Tartar alone cannot produce pyorrhea, etc., except where the vitality of the parts has been diminished. When there is no tartar present, general and local disturbances of nutrition, slight wounds, etc., are sufficient. He states that it is rare in children, as their alveoli contain more blood and have greater reproductive power. The author takes cognizance of the disturbances in circulation resulting from overtaxing the system as a cause, and describes the symptoms and course of the disease. He states that there has been some difference

*[Dr. Römer's paper will be published in full with illustrations in a later issue of the Cosmos.—Ed.]

of opinion as to the way in which bony tissue is disintegrated in pyorrhea. Some speak of it as a molecular breaking down, others as caries, and yet others as necrosis, but no one has yet exactly described the changes which take place.

Dr. Römer illustrates his views on this subject by a number of slides. These preparations clearly show, as Dr. Römer points out, that the bone is converted into connective tissue, although anatomists have asserted that a connective-tissue degeneration of bone is not possible.

His idea of the whole course of the disease is, then, first, that the gums are irritated and infection takes place; the tissues then become infiltrated with round cells. At the same time, from the gums the epithelium grows through this granulation tissue, and this, encroaching upon the normal periosteum, brings about its destruction. It acts upon the bone and brings about a connective-tissue degeneration of it.

Dr. Römer treats cases where the tooth is loosened, and the destruction has extended almost to the apex, by extraction. But where the pocket exists only on one side of the tooth he injects a preparation of cocain-suprarenin; he makes a subgingival injection, and burns out the pocket with the Paquelin cautery. He then cleanses the root mechanically, and finally makes an application of lactic acid.

Discussion.

Dr. W. D. Miller, Berlin, Ger. I would like to comment upon one point that has been mentioned, and that is the degree of acidity produced. That percentage 0.75 is correct, I think, in the case of bacteria cultivated in bouillon, but I have found that bacteria which are cultivated in foodstuffs will sometimes bring about an acidity corresponding to two per cent. of lactic acid. I think you will be surprised, if you will test a cavity where food has been retained for a long time, to see how highly acid it is.

I am inclined to think that the importance of the viscidity of the saliva has been overrated. I have tested a great many cases and have not found on the whole that the viscidity of the saliva has had a very great influence upon the amount of caries present. I have had a number of cases in which the saliva was so viscid that in attempting to pour it from one vessel to another it would go over in a clump, like the white of an egg, and yet the patient was absolutely immune from caries. Also I have seen saliva as thin as water, and yet the teeth were going to destruction.

Dr. W. H. Whitslar, Cleveland, Ohio. I should like to ask Dr. Miller what is his opinion of the views advanced by Dr. Römer upon the connective-tissue degeneration of bone in these cases?

Dr. Miller. I agree perfectly with what he says in this respect. He has sent seven preparations showing the imperceptible gradations of the bone into connective tissue. It is shown so clearly that there can be no doubt in these cases that the bone is destroyed in that way.

Dr. Elgin MaWhinney, Chicago, Ill. I feel that I cannot undertake to discuss Dr. Cook's paper properly, inasmuch as its subject-matter needs very careful study. It is difficult from simply listening to the reading to get the full import of it. There are two or three points, however, that struck me, and I would like to emphasize them.

The first point is that in the mouth we have all kinds of bacteria abounding. Everyone seems to agree that the mouth is a hotbed of every sort of micro-organic life. Dr. Cook has pointed out the reasons why there is a great variation in the activity of these organisms in the mouth; he states the difference is due partly to the chemistry of the saliva and partly to the condition of the cells of the tissue.

Dr. Cook has incidently pointed out some of the causes of the changes of the chemistry of the cells themselves, and I think the paper is full of excellent matter for thought. I know it to be the product of much thought and study, deserving very earnest consideration.

There is one thing which I have observed in my studies, and that is the rapidity with which micro-organic life will accustom itself to environment. Dr. Cook told us that if you submitted cer-

tain bacteria to the bactericidal influences of certain salts, diluted to the point at which they were not bactericidal, the germs would become accustomed to them, and would by and by require a much stronger solution than they would otherwise require for their destruction.

I do not agree with him, however, that the strength of the solution of certain salts determines their bactericidal action. I do not think that can be maintained. I believe there are certain definite percentages of solution in which the bactericidal action will be found to be greatest, due to its electrolytic and osmotic action.

With regard to tissue cell life, we are on the verge of finding out something of the chemistry of protoplasm. What we need is some thorough chemical investigation of the nature of protoplasm and proteid molecules. And that is what we must know before we can know very much in connection with the prevention of certain mouth diseases. Some people think they can put something into a bottle which will be a panacea for all sorts of mouth diseases. But the conditions of the cells will have to be considered in each individual case.

It has been said that the cells in tissue are constantly changing in their nature in conformity with the habits and foodstuffs of the individual. So the problem becomes a very complex one, and all these things must be taken into consideration before we can do much in the way of prevention of these diseases.

Dr. M. L. Rhein, New York, N. Y. A couple of points which have been brought up today have considerably interested me from a scientific standpoint. The first is the use of the term "saliva" in this discussion. I think it a mistake when, in speaking of the oral secretions, we use the term "saliva."

The subject of chemico-pathological investigation of the oral secretions is in its infancy, and its results promise to be of permanent benefit to us. I have thought that the word "saliva" should not be used when we speak of the secretions of the different glands that go to make it up—those of the parotid, of the submaxillary, and others, such as the excretory matter thrown off by the mucous follicles. We obtain from all these a fluid which is a combination from very different eliminative organs. We know that we are discussing a mixture produced by these, but the results of this research can only be properly obtained when the different fluids are considered separately.

Clinically, I believe that some fluids are at fault in some cases, and others in others, and while as a whole they make up the oral secretions, it would be better to speak of them as the "oral secretions" rather than as saliva.

In regard to the paper of Dr. Hopkins, I should like to comment upon the immunity from caries that is observed where there is a slight acid reaction. In my clinical experience I have paid a great deal of attention to this, and while I have no statistics to offer, my conclusions coincide with what Dr. Hopkins has said. I do not say, therefore, that I agree with him in regard to the mucin preponderance, but I do say that where there is a small amount of acidity we are apt to have immunity from caries at that particular time.

Dr. G. W. Cook, Chicago, Ill. I will not make any extended remarks at this time. There was so much material incorporated in the paper that perhaps some of it is not quite clear to you. All the points in the paper require much explanation.

I was extremely anxious to bring to your notice the fact that saliva free from all these inorganic salts possessed some property that had an influence on the growth of bacteria.

I think I shall follow Dr. Rhein in the matter of calling these fluids the oral secretions rather than saliva. We have a variation in the saliva, both in quantity and quality, and I believe that to be one of the fundamental points to be considered in the saliva—I do not see how we are to get away entirely from the use of the words saliva and salivation, as these secretions are produced by the various salivary glands.

Dr. Rhein. Not by the mucous follicles.

Dr. Cook. I believe that the bactericidal properties are transmitted in the saliva almost wholly through the mucous secretions, instead of through the salivary glands. I have no doubt that continued investigations will manifest some very important steps in the line of thought that has been brought out by Dr. Hopkins.

All the work described in the paper was done under the supervision or direction of Professor Stewart, of the physiological department of the University of Chicago. His assistant was expected to be here and bring up a discussion that I think would have been much more interesting than the paper.

A paper submitted by Zahn.-Dr. Hoffendahl, Berlin, Ger., was summarized by Dr. M. L. Rhein, secretary, as follows:

The Constant Galvanic Current in the Treatment of Pathological Conditions of the Teeth.

The application of the galvanic current in the sterilization of root-canals has appeared in dental literature since 1900. Here is given a scientific explanation of the use of electrolysis in its application to dentistry. The operation is based upon the fact that if the anode of a galvanic battery consists of platinum, it produces, through electrolysis, chlorin, oxygen, or ozone. If the conditions for the development of these three substances in a putrid canal be present, complete sterilization of the root-canal takes place in from ten to twenty minutes. The result has been proved by bacteriological examinations after its application, and can easily be demonstrated on any patient.

Discussion.

Dr. G. W. Cook, Chicago, Ill. The essayist's paper is an important one, and I would have gladly given way for the gentleman so that he might have had an opportunity of presenting this paper earlier in the session, when it would have received discussion by a larger audience, as this new therapeutic agency is of great importance to us.

Some few years ago I attempted to do something in the line of applying electricity. I found that by applying electrodes to the root-canals the life of bacteria was destroyed. Observations of the action of electricity upon tissue life suggest the question whether this agency does not do more damage than it does good. We should always bear in mind that an agency that will destroy bacteria will act more energetically on the higher forms of life. Bacterial cells are so differently constituted from the cells of higher forms of life that if bacteria can be destroyed by an agent, the same agent will destroy the normal cells of higher forms of life more quickly. Therefore, for the purpose of obtaining perfect asepsis we should be careful not to injure the surrounding parts while we are destroying the microbes, which are often very resistant.

Dr. R. E. McReynolds, Chattanooga, Tenn. I want to compliment the essayist in bringing a new thought to us in this use of electricity in the sterilization of putrescent root-canals. We have tried it in the sterilization of abscesses in soft tissue, and the X ray, which is really a form of electricity, has been applied to the destruction of fungous growths.

The points Dr. Cook made are very apt, and can be observed by anyone. It is very easy to destroy the soft tissue, and so leave a splendid ground for the further development of bacteria.

Dr. M. L. Rhein, New York, N. Y. I am interested in this paper because I wrote on the same subject as long ago as six years, although I am not surprised that the gentlemen have not heard of my contribution. I shall await the full publication of this paper with interest, for I have read only a summary of it, and I realize that the gentleman is working in a line of practice which I have thoroughly well perfected in the past few years. I understand that the sole difference is in the time of the application and in the material of the anode. I have come to adopt an anode of chemically pure zinc, thereby forcing nascent zinc oxychlorid into the space.

As to the time, my applications have

never extended beyond seven minutes. I have graded them for from three to seven minutes, with from one to ten milliamperes of current.

I believe the profession has in this an excellent method of treating septic canals and the apical region surrounding the root, provided that osseous pathogenic conditions have not developed—if the stage of necrosis of the pericementum has not been reached. It has therefore been my recommendation to my students, in acute alveolar abscesses without fistulous opening, to use this method of sterilization. It should, however, be remembered that the application is accompanied with a great deal of pain. For from twenty-four to thirty-six hours the patient will suffer considerably, to the extent of simulating the onset of pericementitis. But there is no need for worry, as it will subside. I am convinced that the absolute cure of alveolar abscesses can be secured by one single application of this form of therapy. I wish to emphasize the fact that I have used this means myself in many cases.

Dr. McREYNOLDS. I did not understand from the summary that the writer uses this method for the purpose of carrying medicinal agents.

Dr. RHEIN. Yes, that is what the paper has stated. The question of the degree of germicidal effect of the electric current and of the agents resulting from the electrolytic action is in my own mind uncertain. But we do get the effect of the combination of the electrical force with nascent agents.

Dr. McREYNOLDS. As I understood the paper, it referred to the use of electricity alone.

The CHAIRMAN. He does not use it in connection with the drug, but through electrolysis the drug is produced. The chlorin, the hydrochloric acid, and the oxygen are given off, and these act as bactericidal agents.

Dr. RHEIN. That was exactly my own status. The use of an anode of pure zinc is of itself inoperative, but, with the chlorin present, molecules of nascent zinc oxychlorid are set free and forced into the apical region and into the canal.

Dr. N. S. JENKINS, Dresden, Ger. I have had no experience at all with this method of sterilization. I only know the simple methods which are found to be sufficiently efficacious in my own practice. The first thing to do is to relieve the patient of pain; the next thing—and I say it with all due deference to Dr. Rhein—is to keep the patient continually free from suffering; and the third thing is to cure the abscess. I could not hear distinctly all the details of Dr. Rhein's treatment, but I did hear him say that it put the patient to considerable pain. If that be the case, I think it is in this respect bad treatment, because sterilization, cure of abscess, and permanent filling of the root can in almost every instance be accomplished without pain. I heard him say that he used zinc oxychlorid, and I wish I could tell him how glad I am, although I suppose he does not use it in the ordinary and simple way. The result of my experience is that if the apex of the root be filled with zinc oxychlorid, after appropriate preliminary treatment, that abscess is eradicated forever.

Dr. COOK. Dr. Jenkins answered the query I was going to put, namely, in reference to the causing of pain. While he was speaking I was reminded of a little incident. A very eminent surgeon was lecturing for the last time to a class of medical students. He said: "Gentlemen, you will soon leave this institution and it will not be long before the responsibilities of practice come upon you. Probably the first case you will have will be an emergency case. You will have no history of the case or knowledge of the individual, but you are brought at once into a sick-room where a patient is suffering pain. And when that patient is in pain the thing to do is to give him something that will relieve the pain."

Our patients come to us for the relief of pain. We have in this method the liberation of zinc and chlorin, which are very irritating, and I say that neither will destroy bacteria as quickly as they will destroy the cell structure round the tooth. If irritation be set up, I question

if the affected tissue will ever return to its original normal condition. Infected material is present, and it is the destruction of this material which should be brought about. If a less radical method can be employed to modify the infected field so that the development of the micro-organisms cannot take place so fast, it will be better. If a patient came to me with such an infected condition, I would prefer to employ less radical methods. I would give the patient relief and then would let the processes of nature do the rest. I believe that nature can often do more than can be done by all the electricity and agents in the world.

Dr. RHEIN. I realize that we should do what is best for our patients, but with all due deference to my esteemed friends, Drs. Jenkins and Cook, I will say that from the very inception of my practice I could never harbor the idea so beautifully portrayed by Dr. Cook. On the contrary, to me it represents exactly what the student should be impressed not to do. When a patient comes to me I am not there to follow his ideas and directions, but, on the contrary, I should follow my ideas of what is best for that patient. And if my ideas interfered with his notions, our lines as patient and physician must separate and part. I am there to use my judgment, and if the patient be not willing to submit to that, we cannot get along. The case cited by Dr. Cook follows the wrong procedure. I believe that sort of treatment by physicians has been the cause of the death of many people, because the diagnosis of disease is materially interfered with when alleviating drugs are used before a diagnosis is made.

With regard to the question of the infliction of pain in this method of curing an acute alveolar abscess—I speak now as far as possible for our distinguished visitor, Dr. Hoffendahl—I did not state that this treatment invariably caused pain. In my own practice I never use this agent until after I have impressed upon the patient the fact that its use is often accompanied by severe pain for twenty-four hours or longer, but that after that period the disturbance is cured. We know it is cured. If you adopt some other method it means treatment for weeks and months, with possibly a recurrence of the trouble. With all due respect to my esteemed friend Dr. Jenkins, I will say that I have not found a patient—and I have had many treated by this method—who has not preferred that one single treatment to the horror of coming to a dentist week in and month out for the treatment of chronic alveolar abscess.

Dr. C. M. MEADE, Carmi, Ill. I would like to ask Dr. Rhein if, when he has filled a root-canal in the manner he describes, it ever gives trouble afterward.

Dr. RHEIN. I have never known of any, doctor.

Dr. MEADE. No soreness or tenderness?

Dr. RHEIN. Not after the initial soreness has subsided.

Dr. MEADE. I understood you to say that there was soreness in some cases afterward.

Dr. RHEIN. Yes, due to the severity of the treatment; the pain lasted for about twenty-four hours.

Dr. MEADE. And does nature always take care of it afterward?

Dr. RHEIN. Yes, if the case has been well chosen—that is, a case in which there has been no osseous necrosis.

The CHAIRMAN. Dr. Hoffendahl is of the opinion that even after necrosis has developed no more sterilization takes place than about one-half a cubic centimeter above the root.

Dr. RHEIN. Dr. Hoffendahl clearly gives both the amount of time and the strength of the current which should be applied. These are important items, in my estimation. He states that he is as positive of the cure in the case of osseous infection as in other cases. I have not yet reached that conclusion, although I have had many cases where necrosis of the hard tissues has taken place and this treatment has been pursued. I do not feel justified in presuming that those cases are positively cured; we all know how often we get recurrence in these cases of alveolar abscess.

Dr. W. V-B. Ames, Chicago, Ill. In preparing to discuss a paper in another section on electro-therapeutics my attention was called to an article in the August Cosmos, in the department of "Review of Current Literature," in which Dr. Miller is quoted as having stated before the Odontological Society of Great Britain that Dr. Hoffendahl had read a paper on "Electrical Sterilization of Root-Canals." This decided me to mention the matter before the other section. On learning that Dr. Hoffendahl was to read a paper I very much desired to hear it.

In May 1884 I read a paper before the Illinois Dental Society upon the use of the galvanic current for the purpose, and I have followed it up ever since, making the application in various ways.

Dr. Rhein. How did you use it?

Dr. Ames. I have here a copy of that paper from the Illinois Transactions of 1884, in which I said that my attention was attracted by a statement that nascent ozone would sterilize putrid air in the proportion of one part in three million. I was familiar with nascent oxygen by electrical action, and I thought it would be an ideal means of disinfecting the putrid root-canal.

I applied a sponge negative electrode to the cheek or gum surface, and the positive electrode—a delicate platinum or platinized gold wire—in the root-canal, and I would thus decompose the fluid in the pulp-canal. If necessary, I would flood it with a solution of sodium chlorid or acidulated water. Immediate root-filling was the craze then, and I made the statement that in these cases I felt thoroughly safe in filling the root, and that it was the only treatment that I had found which was safe. I can still report that it is the most efficient way of immediately sterilizing root-canals. In the matter of general therapeutics it has been stated to me that the passage of the galvanic current will destroy microbes for a distance from the positive pole, so that an abscess can be aborted by placing that particular point in the direct path of the galvanic current. In my own work I merely counted upon the liberated nascent oxygen and its action in the root-canal.

I think that we should have practiced this method more than we have. Back in those days nobody took enough interest in my statement, on account of the general unfamiliarity with electrical apparatus. I have not used it universally, because its application takes time.

Dr. Rhein. How much time?

Dr. Ames. A ten or fifteen-minute application—occasionally less. But to do it thoroughly, with a fine point passed from the orifice into the canals gradually, would take fully that much time.

Dr. Rhein. You do not know how much current you used?

Dr. Ames. I did it at first more or less empirically. Sometimes one Bunsen cell was sufficient. I was using an electric mallet then, and I used sometimes one and sometimes more of those Bunsen cells—I should say three cells at most. But the amperage and the voltage depended upon the resistance of tissue. Now I would use about three milliamperes of current from a series of cells controlled by a rheostat, according to the resistance of the tissue.

I have not used this method regularly, because I have not always wanted to fill the root immediately, and I can put in an efficient germicide in a shorter time and let the patient go. But the electrical is a most efficient process to enable one to at once proceed safely with the filling of a root on which an abscess does not exist.

Dr. Rhein. You would use it for the cure of alveolar abscess?

Dr. Ames. For the cure of a "blind" abscess I know it would be beneficial, but in such a case I would rather wait, and watch the result of a first treatment.

Dr. Rhein. Have you ever used this treatment for the cure of alveolar abscess?

Dr. Ames. Yes, I have, and had beneficial results. With the very efficient apparatus we have now it ought to be a most useful and practical process. I used the electrode within the root for "blind" abscesses, and in the fistulous opening in cases which had progressed

to that extent. Some present may be familiar with my use of the positive electrode in pyorrhea pockets.

I am very glad that Dr. Hoffendahl has presented the subject in this more thorough and more scientific manner, and trust that with our present greater familiarity with the management of electrical apparatus this process will attract the attention I think it deserves.

Dr. HOFFENDAHL—interpreted by the Chairman (closing the discussion). I have taken particular pains to notice the effect of electricity beyond the apical opening, and I have found that, beyond the apical opening, H_2O_2 is also created in the same way. I have found that the bacterial growths decrease one hundred per cent. within fifteen minutes. After the use of the electrical current for five minutes the bacteria are practically in a state of starvation. I then give the bacteria time enough to revive, because they are then more easily killed than in the first instance. I have resorted to the platinum needle because it more readily produces oxygen. If zinc be used, a zinc oxid is produced which is objectionable.

The pain may have been due to the enlargement of the apical foramen with the needle, and the pushing in of the bacterial matter—especially in tortuous canals—but the pain usually subsides.

Dr. HAWLEY. Is it not probable that the most important factor in the death of the bacteria is the over-stimulation by the electric current?

Dr. HOFFENDAHL. The reason is the production of chlorin and oxygen.

There being no further business before the section, the meeting adjourned to meet at two o'clock the following day, August 31, 1904, in the music hall.

THIRD DAY—WEDNESDAY, AUGUST 31.

The section having been called to order, the minutes of the preceding session were read and approved.

The CHAIRMAN. I have to extend my thanks to Dr. Johnson, the chairman of Section VII, and to its members, for the courtesy which they have bestowed upon this section by allowing us to use this hall.

Ladies and gentlemen, it would be under any circumstances an honor to preside over this distinguished body, but that honor is intensified when it is accompanied by the pleasure of hearing a paper by a friend which has received the highest prize and commendation. I have the honor of presenting to you a man who is known wherever dental literature is read—a man whose name and achievements will be indelibly inscribed upon the pages of dental history for all time. I present to you a man who has stamped every phase of scientific dentistry with his vast and comprehensive knowledge. I have the honor of presenting to you Professor W. D. MILLER of Berlin, who will now read his prize essay, "A Study of Certain Questions relating to the Pathology of the Teeth." I am sorry to announce that he has met with a painful accident, and it is largely for that reason that he has not been able to attend all the meetings.

(See the paper as printed in full in the issue of the DENTAL COSMOS for December 1904, vol. xlvi, page 981.)

Discussion.

The CHAIRMAN. Ladies and gentlemen, you have heard this magnificent paper, and I really feel that I might repeat my eulogistic remarks on Professor Miller in introducing to you the gentleman who will open the discussion of the paper, Dr. Black of Chicago.

Dr. G. V. BLACK, Chicago, Ill. Mr. Chairman, ladies and gentlemen: I wish first to congratulate Dr. Miller on the fact that he has the health and strength and vigor to go through the amount of experimentation which must have been necessary for him in order to present this paper. It is only by such careful, painstaking, and continuous labor that the facts for which we are searching can be developed. Personally, I wish to thank Dr. Miller for the work he has now presented to us.

To undertake the detailed discussion of such a paper is practically impossible

at this time. Such a discussion would require me to have carefully studied the paper, and thought over the various points and compared them with my own work and that of others, before presenting a detailed criticism of its several points. I know, however, that the points made are valuable to science, and will have their influence in the future in the formation of the ideas of the dental profession.

I would have liked very much to have a few of the specimens thrown on the screen again, but perhaps I can recall them to your memory to enforce one or two ideas I wish to suggest. I refer particularly to the specimens showing the undermining of the enamel by decay. The acid has obtained access to the dentin through a fissure or where lodgments of food have occurred, and it has burrowed more rapidly in the dentin than in the enamel, and the decay of enamel has been from the inside outward.

We have in this an exhibition of the results of confinement of the acid and its action upon the various tissues while upon the adjacent surfaces there is no action of an acid. This should create the impression at once that the confinement of an acid upon the surface of a tooth will produce in this confined space a pronounced phenomenon of caries.

In regard to plaques. Taking the expression of the plaque as given by Dr. Williams, Dr. Miller is correct. I have seen teeth of immunes covered with filth, and the expression "plaque," as used today by Dr. Miller, is nothing more than this. Masses of micro-organisms may be growing in a greasy mass on the tooth for years together, and yet produce no decay. That mouth is immune.

This is not the plaque that I have mentioned, and I am convinced that Dr. Miller has never seen this plaque. I hope he will find it. It is a transparent mass; so transparent that when the teeth are apparently cleaned the plaque remains. I have seen some of it in the pictures shown today. You will not discover with the eye that there is a plaque, it is so transparent. But if you will pull it off carefully, you will have a plaque with only a slight yellowish tinge, and this is the only plaque that I have spoken of as having an influence in the beginnings of caries. It is not found generally, but only in those mouths in which decay is progressing rapidly. I have grown this plaque artificially and have seen it in large masses. And I am sure that under certain dietetic conditions it is produced. Until Dr. Miller has seen and examined it for himself, I do not expect that he will speak otherwise than he has done today.

Why is caries localized upon certain points on the tooth? First, because of the opportunity for the lodgment in pits, fissures, and grooves; the opportunity for the confinement of the products of acid formation at certain points, as upon occlusal surfaces and approximal surfaces, making a narrow space in which the tooth is not clean. Ninety-nine per cent. of the decay which we meet occurs on buccal surfaces near the gum. The accidental cases occurring at other parts merely prove the general rule. Now, why this localization? I wish to bring the question prominently before you. Teeth rarely decay except in these unclean regions and where the acids produced may be confined to the locality. In other words, the saliva never becomes so acid as to produce decay. Decay occurs only when it is confined in this manner.

In immune persons I have twice unwittingly made experiments by cementing on bands and leaving them too long. Either through the cement not being well placed in the beginning or having dissolved out, micro-organisms growing under it caused a ring of decay nearly as broad as the bands, no other decay occurring anywhere in the mouth. We shall have to account for the confinement of the acids in these localities before we have all the phenomena of decay in our minds.

I should not say that there could be no decay without bacterial plaques, because we can produce it in mouths believed to be immune. But it occurs because of the confinement of the acid in a particular locality. What may be

the surroundings in the other cases we do not know, and if such workers as Miller, Michaels, and others who are attacking this problem can give us the information, they will do well. And let me say that these scientific questions are those upon which our operations must be based. They are the practical questions of the future—questions of the utmost importance to us and to our patients.

I wish to thank Dr. Miller for his observations upon the enamel cuticle, which are practically very important, if what he has said is correct; and, reviewing hastily my own observations upon the enamel cuticle, I feel certain that he is correct, although I had not placed it in the light in which he has placed it today. We have lessened the resistance of the teeth to decay by removing the enamel cuticle. That is a point of considerable importance.

The question of the calcium salts is important; it is one that should be brought before us prominently and correctly by the chemist. My own experimental work had reference to the calcium salts and to the hardness and softness of the teeth as shown by those salts. As the result of my own work I have made the remark that there seems to be something of the strength of the tooth due to the condition of the basic substances, aside from the amount of calcium salts. What may be discovered in that particular direction I do not know. Dr. Miller's work, so far, does not bring that to the front. I have wondered if chemists cannot give us the proportion of calcium carbonate and phosphate in tooth-structure—those salts that are more easily dissolved, and those that are dissolved with more difficulty. There is a problem there to be worked out. I do not regard as yet the differences in solution of different teeth as being sufficient to account for the differences in caries of different teeth, or in the teeth of different persons—not by any means. It is certainly the case that secondary deposits are not acted upon as quickly as is normal dentin; if the secondary deposit be full of interglobular spaces it decays more quickly than normal dentin. Most secondary dentin is comparatively without dentinal tubules; and all these things come into play. It is possible that the dentinal tubules in the hyaline zone may be filled more or less with the fat which gives prominence to them as clear spaces, and for this reason they are not penetrated as rapidly by acids as are other regions. I throw that out as a probability; it is a question that has been in my mind for observation and study during the last twenty years.

The question of diathesis is of great importance in this connection. It is not a question whether micro-organisms grow in this mouth and that mouth. I have cultivated them many years with this question in my mind. I have yet to see the human mouth in which they were not growing, and I think Dr. Miller will say the same. They are growing in the mouth of everyone, whether decay be present or not. There is something in the diathesis which gives this power to produce decay to some varieties, and which robs them of it in others, and we must continue our search until we find the causes of this. We have not found it yet; we have not explained it yet; and until we have explained it in scientific terms we have not finished our work in this direction. I suppose there are few people who will question the fact of the bacteriological cause of decay as developed by Dr. Miller twenty years ago. And I think we should do well to thank Dr. Miller for that development now with a rising vote.

The assembly accordingly expressed its appreciation of Dr. Miller's work by a rising vote of thanks.

Dr. James Truman, Philadelphia, Pa. When I rise to consider any subject of this character I sometimes prefer to be in opposition to the one opening the discussion and not to the facts as presented in the paper. When Professor Miller comes before us, I feel sure that he will go down to the foundation of things and give us facts as to which there can be no dispute.

I have been much interested in this paper for a number of reasons. First, that he has demonstrated that the so-called gelatinous plaques of Williams are

not productive of caries. I feel that the illustrations given on the screen have fully upset that theory. I cannot understand, therefore, Dr. Black's statement that Professor Miller has not reproduced the plaques as he (Dr. Black) has seen them. It seems to me that if Dr. Black is so sure that the plaques, as he has understood them, have not been represented on the screen, it becomes his duty to demonstrate to the profession that he has seen something else. I may, however, have misunderstood him.

Dr. Black repeats the suggestion made by Wedl thirty-four years ago, that the transparent zone of Tomes is the result of infiltration of fat globules in the tubuli. This has never been proved, and further, is not sustained by the fact of the development of secondary dentin where slight irritation invariably produces an increased deposition and further development of this tissue. The same law operates in the one case as the other. It is very evident that this transparent zone is the result, not of fat globules, but of an increasing deposit of calcium in all respects similar to the so-called senile dentin, where the tubulated structure is frequently entirely lost.

I was also pleased with the demonstration that proved that silver nitrate had no deterrent effect in preventing caries. Silver nitrate has a valuable place in the therapeutics of dentistry, but it cannot be used as a mouth-wash, as has been recommended in certain quarters; and this clinical observation is sustained by Professor Miller's work. It is probable that this, as represented today, will cause a revolution in thought in our profession, leading to more care in the use of this agent and to a more intelligent appreciation of its effect upon the tissues of the teeth.

I trust that those present, in listening to this paper, are prepared to indorse the action of the Committee on Prize Essays in conferring the highest honor on Professor Miller.

Dr. E. S. Talbot, Chicago, Ill. I wish to congratulate Dr. Miller upon his excellent paper and his work. His slides brought out fully the work which he has accomplished. It would be strange, however, if in viewing this subject we did not differ. I am sure that Dr. Miller would feel hurt were we merely to pat him on the back and say that he had given a magnificent paper. The criticisms of Drs. Black and Truman throw a different light upon some of the points under discussion. Tooth-decay demands study from a broader standpoint. Conditions around the teeth are not all the causes of decay. What has been said demonstrates conclusively that, as I have elsewhere pointed out, other conditions must be taken into consideration. In the evolution of man teeth are growing smaller and degenerating in type, whence the change of shape. This suppressive economy of growth has as much to do with the decay as anything else.

Dr. Black asked why the decay is circumscribed, and he here brought out a point which no one will deny.

In the development of the teeth, degeneration takes place in the enamel as well as in the dentin. Not a slide put upon the screen failed to show degeneration in structure. The fissures shown where the plaques extend down into the dentin indicate malformed teeth, and this malformation is a phase of evolution and embryogeny.

To the balancing power of the nervous system must we look for healthy composition of the teeth and other structures, and to the underlying law of economy of growth—since every part of dental pathology has a developmental basis. If a mother be not nourished, or if from worry her tissues fail of proper development through lack of nutriment to be carried to the particular part, the fetus cannot be well developed, and suppressive degeneracy must occur.

Dr. Black discussed accurately the difference in structure. A patient comes to have his teeth put into a healthy condition. He is afterward taken with typhoid fever, pneumonia, or other constitutional disease, whereby his system becomes poorly nourished. Let him then return to his dentist, and a difference in structure and discoloration of the teeth are found. Following the death of a

relative of mine, his wife in six months had a change in the structure and color of her teeth. I have tabulated many such cases. In grief or worry from any cause the structure of the teeth will change, and decay will take place. Fill the teeth of a young lady going to a boarding school; let her return in the spring, and not only new cavities but decay are found around the margins of those filled. Some dentists may claim that the fillings were poor, but this has been repeatedly disproved. The decay is caused by the extra amount of work; the nervous system is overstrained, and this change has resulted. The balancing power of our nervous system has much to do with the decay of the teeth—probably more than anything. The diathesis is likewise important.

Dr. G. W. Cook, Chicago, Ill. I have not only been interested in Dr. Miller's paper today, but in his work from my first recollections of dentistry. There are several points of this paper which might be discussed with considerable benefit, but time will not permit of details. Dr. Talbot has brought out the point in regard to the changes of the physiological activity of the human being as a factor in the production of soft teeth. I do not believe that the structures of the tooth have changed so much as have the fluids of the mouth and consequently the activity of the organisms in the oral cavity. I think that that is one of the main factors.

While we can appreciate the development of the tooth-structure, still there are changes in the life-processes of the individual that must change all the fluids of the human body. Take diphtheria: an individual may be immune to the action of the Klebs-Loeffler bacillus, yet tomorrow there may be susceptibility to it. Why? Today the bacillus may be in the oral cavity without detrimental action, but the fluids of the cavity change and call up the virulence of the organisms and lower the vitality of the mucous surfaces. The teeth do not change as does the pathological structure of the mucous surface, but the secretions change. We know there is a change, for one day we can find perceptible traces of the conjugated sulfates, while the next day they have entirely disappeared. The change in the culture medium of the organism may be caused by the nervous system or some other function of the body. But I do not believe that the teeth change.

From some work that I have done I am convinced that the organisms that live in the oral cavity are undergoing various physiological changes, and that they change the quantity of acid or other toxic conditions that are present.

Dr. Miller has the honor of having placed this subject on the firmest foundation of any pathological condition occurring in the human race. To him is due the honor of laying the foundation that we can at least work upon. (Applause.)

Dr. C. N. Johnson, Chicago, Ill. It would give me a great deal of pleasure to take part in this discussion from a scientific point of view. But I think we shall be able to do that better when we have the paper printed and it is before us for careful reading in full. I want to thank Dr. Miller for his contribution to this congress, and to tell him how much we appreciate his coming here. I think the size of the audience will indicate that. And we are also proud of the fact that, as Dr. Cook has said, he has placed this question upon the most scientific basis of any question in connection with dentistry.

Dr. Johnson then announced that some interesting slides illustrative of the work and methods of the eighteenth-century dentist, Pierre Fauchard, would be shown immediately after the close of the discussion on Dr. Miller's paper.

The Chairman. I can only second this proposition as chairman of Section II. We owe it to ourselves as a matter of instruction, and to the author of the paper as a matter of courtesy, to see these pictures. I hope the audience will remain for that purpose after the close of Dr. Miller's remarks.

Dr. Miller (closing the discussion). I wish to thank the gentlemen who so kindly discussed the paper. I

have only to say to Dr. Black that my strictures on the plaque do not apply to his plaque—if, as he says, I do not know what his plaque is. But, if I am able, I shall certainly make a pilgrimage to him in Chicago for the purpose of making its acquaintance—and I do not know anyone more worthy to be the object of a pilgrimage than Dr. Black.

I also agree with him in what he says with regard to the necessity of confinement of the acid. But it is confined sufficiently in the fissures and cavities of decay and between the teeth where the food lodges. Examine any case you like, and you will find starchy foods between the teeth to have a strong acid reaction. What more do you want?

I do not agree with him as to the transparent zone. I have not found fat in it. It does not occur in dead teeth. It is a sclerosis of the dental fibrils, a diminution of the caliber of the tubules by the production of dentin on their periphery. It is a consolidation of the dentin, and the acid does not penetrate such dentin as rapidly as it would the normal dentin. Dr. Truman has made that point clear.

As for the chemical composition of the dentin, I have repeatedly pointed out that it is not by any means simply a question of the percentage of calcium carbonate or phosphate, but of the combinations formed by these substances with the organic matrix. On this point our knowledge is at present totally deficient.

Dr. Talbot remarks that I have not considered the constitutional side of this question, but I would remind him that I have been able to present at this time only about one-half of my paper. I understand also that the lines to which he refers in the enamel are defective structures. They are not, however, degenerations, they are faulty development. They are uncalcified enamel prisms.

I doubt, as I have stated before, whether a degeneration of a tooth can take place after it has once become fully developed. I do not believe it has been proved that a hard tooth can become soft. If Dr. Talbot has preparations to demonstrate that, I shall be very glad to see them.

In the case of the school-girl, I think the decay can be explained. In the first place she does not clean her teeth, and secondly, she is constantly eating chocolate.

Discoloration is not necessarily a sign of degeneration, because we know our dead teeth discolor often enough. It is a chemical process, and may be independent of vital changes in the tooth.

I wish to thank Drs. Truman and Peck, also, for their courteous treatment of my paper, but I beg to be excused from continuing the discussion, as I am suffering considerable discomfort from the prolonged speaking. I thank you all very heartily for your patient attention to my long paper, and hope on some other occasion to meet you under more favorable circumstances.

The CHAIRMAN. I again rise to thank Dr. Johnson for the use of this room, to thank the audience for their close attention, and Dr. Miller for his magnificent paper.

Dr. G. V. BLACK, Chicago, Ill. I wish to make a motion. Twenty years ago and more, Dr. Miller first demonstrated to the dental profession the bacterial origin of dental caries. In the twenty years that have elapsed since the first publication of his articles the correctness and the great value of his work have been more and more impressed upon the minds of men. It seems to me fitting now in Dr. Miller's presence that we, in congress assembled, should express this fact to Dr. Miller, and give him assurance of our most hearty appreciation and thanks for that work. I move that this be embodied in a resolution, as follows, and that we pass it now by a rising vote:

RESOLVED, That the dental profession, in the Fourth International Dental Congress assembled, wishes to express its gratitude to Dr. W. D. Miller of Berlin for the noble work done by him twenty years ago in developing the facts of the direct relation of bacteria to the causation of caries of the teeth, the truth of which has stood the test of many and repeated corroborative experiments by

others, and year by year has come to stand out more and more brilliantly as a great scientific achievement of lasting good to humanity.

The Chairman. Gentlemen, you have heard this motion, which is duly seconded. I beg you all to rise.

The motion was unanimously agreed to.

A paper by Dr. T. Fujishima, Tokio, Japan, entitled "A Case of Odontome," was read by Dr. M. L. Rhein, as follows:

A Case of Odontome.

I feel it to be a great honor to be permitted to make a report of my experience in this great meeting.

In September 1896, I inspected a patient by his request. He was thirty-two years of age, stout and strong, and his teeth were all in splendid condition, not a single decayed tooth being found. His complaint was that he had had frequent temporary pain in the region of the lower left third molar, from about a year ago, this afterward leading to toothache of the whole of that side with hemifacial pain. The pain was not continuous, and he did not have much anxiety about the case, as he believed that the pain was due to the growth of the third molar, and would end at its eruption. But the pain increased with time, and sometimes his body temperature was brought up to 40° C.

One of the physicians diagnosed the case to be due to the developing third molar, and the part was cut. Yet no relief was obtained; the pain remained as it was. Another operation was made, but again without success. The physician then brought the case to me. On very careful inspection, no trouble was found at all, except that in the third molar region, closely back of the second molar, something like a tooth was felt beneath the gum. It being my belief that this was to be accounted for by the third molar in its growth leaning forward, a cross cut was given to that portion of the gum, and it was pressed hard with a cotton ball. On inspection of the fissure after cessation of the bleeding, what had been supposed to be a third molar was found to be a protuberance on the second molar, and at the same time a small hole was found at its back surface. Cocain was injected, and the tooth was extracted. It was discovered that the specimen was an odontome of the root. After extraction there was no particular trouble in effecting a cure, except that the fissure took somewhat longer than usual to recover.

After a lapse of seven years—or in October 1902—I found another odontome on the third molar of the same patient. Only a small portion was visible, and it looked like caries of the jaw. Extraction of the same was suggested, but the patient did not accede to it from fear of pain. He did not come to me thereafter, and when I called on him the following March, a painful cavity was found at the front corner of the jaw, and blood was running out. The odontome, at the same time, was exposed beyond the gum to an enormous area. I made an impression for a specimen, and this was taken out afterward. The wound was treated by a surgeon, and recovered in a short time without difficulty.

I wish to classify this case according to Dr. Bland Sutton's theory, who defined odontome as follows: "Odontomes are neoplasms composed of dental tissues in various proportions and different degrees, or teeth still in the process of growth."

Odontome number one must have resulted from aberration at the back of the tooth, which in process of its growth had just completed the formation of its crown and started the formation of its root. A part of the papilla inside must have suffered some interruption of development. The imperfect formation of the crown of the tooth naturally caused imperfect development in the process of enamel organization. The carious cavity on the enlarged root resulted from the aberration, and the lack of resistance made it decay after growth.

Odontome number two resulted from abnormal growth by aberration of all the elements of the tooth-germ—enamel

organ, papilla, and follicle—caused by irritation on the whole tooth-germ.

Discussion.

Dr. G. W. Cook, Chicago, Ill. I do not see that there is any particular comment to make on this case. It is a perverted activity of the enamel cells placed in some obscure part of the alveolar border. It may form at the buccal side of the root, but as odontomes are ordinarily found there may be a great number of enamel portions lodged in the jaw—epithelial cells wandering away and depositing enamel or some other hard tissue. In one case I know of there were seventy-two of these small enamel tumors in the jaw below the alveolus.

This subject cannot be discussed at length without a familiarity with the case we are discussing, and I do not think that a general discussion of the subject would be of great value to the section at this time.

The Chairman announced that the section would meet next lay at 2 P.M.

A motion to adjourn was made and carried.

(To be continued.)

NEW YORK ODONTOLOGICAL SOCIETY.

Monthly Meeting—October 1904.

A REGULAR meeting of the New York Odontological Society was held on Tuesday evening, October 18, 1904, at the Academy of Medicine, No. 17 West Forty-third street, New York city.

The president, Dr. John I. Hart, occupied the chair and called the meeting to order.

The Secretary read the minutes of the last meeting, which were approved.

The paper of the evening was then read by Prof. EDWARD S. PECK, M.D., professor of diseases of the eye at the Post-graduate Medical School and Hospital, senior ophthalmic surgeon of the City Hospital, etc., as follows:

PATHOLOGICAL RELATIONS BETWEEN DISEASES OF THE TEETH AND OF THE EYE, ARISING FROM RHEUMATISM AND GOUT.

In presenting this topic my purpose is not to attempt to introduce anything new, and certainly nothing novel, in the elucidation of pathological relations that exist between certain forms of disease of the teeth and the eye. I shall aim to emphasize relations that cannot be explained in pure coincidences, but that have a direct and intimate bearing upon certain diseases of the teeth and of the eye, dependent for pathological origin on rheumatism and gout. In so distinguished a body as this I would not presume to go beyond the mere mention of these individual dental diseases, on the ground of my incompetence to do so; and on the other hand I hope not to burden you in this brief paper with anything more than the general trend and relative significance of ocular disease having a similar origin. To do this in a comprehensive way necessitates an essay whose argument is analytic rather than synthetic.

When one searches the authoritative literature both in dentistry and ophthalmology, one is impressed with the paucity of material bearing directly on this topic. Contributions on dental and ocular disease in this field are not large, whereas contributions on syphilitic, scrofulous, rhachitic, tuberculous, and cancerous disease of both teeth and eye are abundant. The larger issues of literature are from

German and American collaborators, whereas England and the strictly English races furnish by far the greatest amount of rheumatism and gout, not only of the teeth and eye, but of other tissues of the body known to be the special habitat of these deposits.

In one brief sentence it may be said that these deposits of rheumatic and gouty poison find their way by selection to the fibrous tissues. So far as the teeth are involved, these poisons are deposited on those situated nearest the medial plane of the mouth—chiefly the incisors—a pathological fact due to the larger amount of lymphatic and specially secreting glands in the labial and central buccal regions. As to the eye, an organ of more delicate and even more sensitive nervous morphology, not only the hard external covering of the white sclerotic coat and the tough transparent cornea in front, but also the delicate optic nerve, retina, and chorioid at the back of the organ, as well as the very sensitive iris and ciliary body near its center, are the pre-eminent seats of deposit of rheumatic and gouty poison.

An intelligent study of rheumatism as a factor in disease of the parts here associated demands a brief study of rheumatism itself. What is rheumatism? The very name is from our conception a gigantic misnomer. The word "rheumatism" means a condition of catarrh, a *rheum*. The term was given before Hippocrates wrote, and by him the term is called a synonym of catarrh. Long before any knowledge of lymphatic selection the ancients had conceived a species of humoral pathology—to us a pathology of humor! It was not until the seventeenth century that its present significance was conceived, and this was by Baillou, a French physician, who also first differentiated between rheumatism and gout. Sydenham first described its migratory character from one joint to another. Cardiac affections dependent on rheumatism were not recognized till 1836. Rheumatic diseases of childhood and the subcutaneous fibrous nodules peculiar to adolescence were first carefully noted by Hirschsprung, Barlow, and others, as late as 1875.

Various theories of the pathology of rheumatism have been brought forward, none of which are free from objection, and none of which have met with anything like general acceptance. I will merely mention them as of historic and curious scientific interest.

THEORIES OF THE PATHOLOGY OF RHEUMATISM.

First: The *nervous* theory of rheumatism took rise in America, and was suggested by Dr. T. R. Mitchell, who explained all rheumatoid attacks and rheumatic involvements on the ground that the lesion was in the spinal cord. Unsatisfactory and untenable as it has been proved, such painstaking and clever students as Canstatt and Jonathan Hutchinson were its warmest advocates. The latter went so far as to maintain that a catarrhal neurosis acts as an "excitor influence" in producing true rheumatism.

Second: The *lactic acid* theory, which argued for a chemical poison in the blood due to some process of perverted nutrition. Fuller of England was its pronounced and popular advocate, though it did not originate with him. Lactic acid is a product of tissue change produced in muscle while in a state of high or prolonged activity. Profuse perspiration is the effort of the system to throw off the poison. Lactic acid cannot exist as such in the blood, as the blood is never found acid during life. Neither has any evidence been brought forward that lactic acid is in excess in the blood of rheumatic patients. On the other hand, it is well known that lactic acid, when injected into the system of man and the higher vertebrate animals, will produce all the symptoms of an acute arthritis. The well-known experiments of B. W. Richardson and Sir Walter Foster prove this.

Third: The *uric acid* theory, of which Haig is the warmest advocate. Haig based his argument on the possibility of eliminating uric acid and urea from the

blood by an extreme antacid and non-nitrogenous diet, and by the curability of both rheumatic and gouty affections of various tissues of the body with sodium salicylate. It is to be said that uric acid is not found in the blood of rheumatic patients, nor is sodium urate found in their joints. Haig's experiments in diet and medication are most ingenious, and within certain limits his methods were efficacious.

Fourth: The *infective* or *microbic* theory of the origin of rheumatism is the one in vogue today. Although many of the manifestations of rheumatism cannot be explained by this theory, most of them can be. Those manifestations amenable to the microbic theory are as easily explained as are those of pleurisy, pneumonia, pyemia, and some of the infectious fevers resembling typhoid and malaria. One can, for instance, explain heredity only on the ground of an infective or microbic poison.

Haig's theory of rheumatism has received so much attention both by advocates and adversaries that a consideration of its argument is most fitting in this connection:

Urea is the expression of tissue waste, and is formed from nitrogenous products derived from the blood. Uric acid is in its final stage of formation in the kidney. This is so not only in man, but in many of the birds and vertebrate animals. Uric acid, hypo-xanthin and xanthin (both the latter being equivalents of uric acid) are found in all animal flesh, just as they are found in the tissues of man. Roughly speaking, meat, fish, fowl, game, and eggs contain 6 to 8 grains of uric acid to the pound. Certain vegetables, such as peas and beans and others, contain 12 to 15 grains of xanthin to the pound. Tea contain 175 grains to the pound, and coffee and chocolate less, but yet a large quantity. Uric acid produces two effects on the physiology of metabolism or tissue change: first, defective combustion, when in excess; second, local irritation, when driven into the individual tissues. "Metabolism is the change in the tissues of the body which produces from the food we swallow the heat and force which we evolve." The human body is, then, nothing more than a machine to convert a certain amount of force taken from the sun and dormant in food into visible heat and energy.

Haig arrays stimulation against nutrition, not only as a process essentially different, but one eminently antagonistic to it. He styles it "merely calling out the reserves," with the result that "physiological bankruptcy must follow a prolonged course of a diet of stimulation." By stimulation is meant meat and eggs essentially, then tea, coffee, etc., then alcohol, opium, and other stimulants usually in vogue as such. He argues that physical degeneration of the nation, just as physical degeneration of the individual, must follow. Evidently the cue is taken from his own nation, whose substantial diet is a stimulating one, and in which gout and rheumatism play a very high rôle. It is well known that England has more gout than Germany, because the English nation eats more meat by far. On the contrary, the Scotch people have little gout, due possibly to the fact that the national beverage contains little or no acid, while as a nation the Scotch eat less meat and nitrogenous food than do the English. A Scotchman living in England and eating meat and drinking wine and ale will have real English gout. As to stimulating drinks, their ability to produce gout is largely increased by the amount of meat and nitrogenous food ingested, uric acid being not only introduced but actually more rapidly formed in such individuals and nations. Garrod says that the least acid of all the alcoholic drinks is whiskey, and perhaps the American citizen has learned to love his Scotch brother more tenderly since he learned the lack of acid in his whiskey.

There are certain manifestations of rheumatic and gouty poison that should be noted here. For instance, inflammations of the fibrous tissues of both the eye and the teeth are more painful toward night, when the blood pressure and temperature are highest, and after the disturbances of digestion have had

full swing during the day. Sedentary work predisposes to both diseases, especially gout.* In fact, "gout seldom attacks persons employed in constant bodily labor."† Gout has been called a winter disease,‡ because less uric acid is excreted and more is retained during this season on account of the decreased activity of the skin. Damp and cold were regarded by Charcot as most potent factors in its causation. A laboring man has less gout than a sedentary man for the same reason: his activity keeps down the percenage of retention of uric acid, just as it keeps up the percentage of secretion from the skin. The skin, therefore, shows more uric acid and the blood less.

Heredity implies a disposition to gout and rheumatism, while diathesis plainly asserts it.

It is found mostly in domestic servants, as coachmen, cooks, among smiths, factory hands, school-children, and married women. Women have less gout than men, due to a difference in habits and environment. At the menstrual epoch women have less gout than at any time of their lives, at which time the urine is less acid. It has, however, been stated that women have more rheumatism and men more gout. As to women, two years before and two years after the menopause are the most prolific times for its assertion. Pregnancy and lactation, as also uterine affections, predispose to rheumatism. In women the most fruitful age for rheumatic affections is between the forty-fifth and fiftieth years; in men the age is between the thirtieth and thirty-fifth years, after which there is an arrest of gouty manifestations, with another outbreak between the fiftieth and fifty-fifth years of life. The factor of age has given rise to the inquiry as to whether rheumatism, and more especially gout, in its chronic or subacute forms is a specific disease at all, or whether it is an expression of the wear and tear of senility, of which it may be a prominent factor. And yet how often, in cases where the habits of the individual do not involve wear and tear of the tissues, are these expressions found, and, too, manifestly in association with uterine derangements, mental anxieties, emotional attacks, etc. Defective nutrition, or dystrophic changes of the nervous and muscular systems may originate in a variety of ways, and a distinctly localized part such as the eye or certain groups of teeth may prove the habitat of such pathological change.

Let us now depart from a consideration of the strictly pathological causes which underlie the special dental and ocular diseases, and take up some of these diseases themselves. I will not attempt an elaborate description of them here, but will repeat that the poison of gout and rheumatism affects more especially the fibrous and fibro-cartilaginous tissues of each group. If this paper draws out more in detail a discussion of the pathological similarity and dissimilarity of these diseases, its purpose and its worth will have been confirmed.

First, as to the teeth: Erosions on the enamel are due to an acid formed within the body and not to an external abrasion.* These occur usually in patients with a family history of rheumatism, or with a personal history of rheumatic arthritis, or chronic joint rheumatism.

The by-products in urea formation and the waste products of suboxidized albumin are unquestionably the cause of the erosion of the enamel of teeth. Whatever the chemical controversy may lead to, as to the chemical relation between uric acid and urea, it is well known and undeniable that uric acid increases in amount when the oxidizing processes are below par. Uric acid cannot exist in the blood, and urates are found depending in amount on the excess of white blood corpuscles; conditions of chloro-anemia, of leucocytosis, and of degenerative blood-changes amply illustrate this. Again, in acute explosions of gout in the full-blooded individual

* Garrod.
† Cullen.
‡ Sydenham.

* Burchard, "Text-Book of Dental Pathology." etc.

who overfeeds and overstimulates his system, the tissues of the body become drenched with an excess of material which is unfit for physiological metabolism; the result is an excess of urates in the system. The products of such excess, of such cell waste, are of acid reaction. Systemic gout can be diagnosed through those erosions of enamel which, as is well known, occur on the labial surfaces and among the central teeth, and this where other and more pronounced clinical symptoms of general gout are not manifest.

Second: Gingivitis, or marginal gingivitis, has gout for one of its general nutritional causes; also rheumatism, pregnancy, fevers of malarial type, etc. The relation of gout and rheumatism with certain forms of gingivitis, and I might add with some other early and late forms of pericemental diseases beginning at the gum margin, is unquestioned.

Third: Pericementitis is a variety of pyorrhea alveolaris, largely local and traumatic in origin, but not infrequently associated with gout, as it may be also with tuberculosis, albuminuria, diabetes, or typhoid. Gout is not only a predisposing cause, but cases occur which illustrate also its exciting rôle in pericementitis. Reese, Marshall, and Peirce have clearly pointed out this association. So conspicuous is the gouty involvement that deposits are found on the lateral and labial aspects of the pericementum between the apex and the marginal border. Dental gout is strikingly shown in this disease, while similar manifestations of gout, as concretions, do not appear elsewhere in the body until after the thirtieth or fortieth year of the life of the individual, and frequently not until the fiftieth year. The category of symptoms is unique. Usually at first, neuralgic pains occur nightly, without any apparent reason, there being no exposure of dentin and no tenderness on percussion. Changes of heat and cold are promptly noticed, and the pulp becomes sensitive. Dental and maxillary reflexes begin to assert themselves, a slight recession of the gums is seen and general soreness follows, while not until a much later period dentoliths and calculi will be found high up on the tooth. Frequently a true gouty pericementitis goes on without the formation of a calculus, or even of caries.

There is perhaps no process in dental pathology so dependent upon or so associated with gout as certain forms of pericementitis. Does not the formation of the pericementum and the alveolus furnish a true analogue of a joint, with all the elements of fibrous and fibro-cartilaginous structures? We must not forget that the pericementum is anatomically a ligament as well as a periosteum, and that the junction at the alveolus is a joint. Hence the answer to the question why gout should attack the teeth.

I have anticipated your indulgence in this brief portrayal of the most salient forms of dental gout, leaving to your judgment the introduction of other more subtle and perhaps more interesting forms. It seems incredible that any doubt should be thrown on the causal relations of uric acid and urea in these forms of disease. The presence of urea in the blood serum, where it is fully soluble, and in the kidneys, is undeniable, but the presence of uric acid is not always demonstrable.

Degenerative changes referable to gout may be found in other parts of the body simultaneously; as, for instance, in the small joints, especially of the feet and fingers. Sometimes these changes appear as obscure affections in internal organs; as, for instance, in the heart and bloodvessels, especially in the arteries, in the lungs, stomach, liver, and kidneys. Degenerative changes due to gout occur very frequently in the eye, ear, and throat. Tissue debility usually precedes an attack, and the gouty urates first seek a non-vascular part, and where fibrous or fibro-cartilaginous tissue abounds; then irritation and inflammation are set up, or necrosis may follow. In gouty and rheumatoid degenerations tissue waste is great and tissue metabolism is below par, clogging occurs, and the equilibrium of metabolism is destroyed. The final result is an explosion of urates of sodium or magnesium or potassium.

The ocular tissues most directly involved in rheumatism and gout, taken in the route from before backward, are as follows: The *cornea* in front. This is the transparent and refractive, as well as highly fibrous and protective tunic, constituting about one-sixth of the circumference of the eyeball. The white *sclera* behind, called sometimes "the cup of the eye." This is a dense fibrous and highly protective coat representing about five-sixths of the remaining circumference of the eyeball. The delicate *iris,* whose fibro-elastic bed forms the skeleton of an otherwise highly vascular and nervous layer, and whose function by means of its pigment cells, and peculiar contracting and dilating pupil, admits the proper amount of light into the interior of the eye. The *crystalline lens,* a biconvex and transparent body when not in a condition of cataract, whose function, by means of its highly convex surfaces and high transparency and its limited antero-posterior motion, is to exactly focus the rays of light upon the retina, enabling the eye to see accurately. The *retina* itself—a most delicate framework of fibro-elastic tissue, endowed with fine visual sense by means of its remarkable arrangement of nerve cells, nerve fibers, rods and cones, and its spot of exquisite visual sense located in the right optical axis of the eye. The *chorioid coat* behind the retina, with the grape-like bunches of rich bloodvessels in front; and lastly the *optic nerve,* proceeding, as the second cranial nerve of Sœmmering's classification of twelve pairs of cranial nerves, from the inferior and lateral motor tract of the central brain tissue through the ragged foramen at the apex of the orbit directly to the posterior part of the eyeball, where it expands into the retina. In addition to these, the lacrymal passages on either side of the nose, the delicate conjunctiva in front covering the inner surfaces of the lids and the outer surface of the eyeball, and lastly the bones of the irregularly curvilinear orbit, may be the seat of deposits of rheumatic and gouty poison.

In a paper of circumscribed limits, as this must be, it will be impossible to enter specifically into the manifestations of these diseases, for they are of very different forms of exhibition and of very different grades of inflammation. While gouty deposits may be found in all the tissues mentioned, I will specify only two habitats at this time, viz, gout in the chorioid and in the crystalline lens. The chorioid coat of the eye lies between the retina and the sclerotic. Like both of these it is subtended from the tough fibrous sheath which envelops the optic nerve, and which is an extension of the dura of the brain forward to almost the junction of the sclera and cornea in front. It is an exceedingly delicate layer or tunic of the eyeball, and its bed or groundwork consists of a very thin fibro-elastic cobweb, in which lie the two layers of bloodvessels which almost entirely feed the eye. The two layers of bloodvessels are classified as the outer venous and the inner capillary layers, on account of the relative size of the bloodvessels contained therein. In the interstices between these nests of vessels are deposited the concrete salts of gout—degenerative processes which are not accompanied with pain nor at first with any loss of vision. After some months or years they coalesce, and form scales flat and oval in form, with a shape not unlike that of the finger-nail. What was monolith becomes gradually concretion. They cannot be removed by other than by dietary and medicinal agents. In time, until an arrest of development of concretion occurs, that part of the eyeball will become hard and scaly, and will give an egg-shell resistance on percussion. The chorioid furnishes the most glaring developments of calcareous degeneration in the eye.

The crystalline lens may become the seat of gout, and as such a lime or calcareous cataract is formed. This is not true cataract; nor are all deposits upon or degenerations of the lens true cataract. I wish here to call attention to the fact that eighty to eighty-five per cent. of all persons over fifty-five years of age have spots or opacities on and in the lens of the eye. When they occur in the center

or nucleus of the lens a true nuclear cataract will surely follow in time. It may be within one year or it may be much later. Deposits of calcium usually form first in the cortex, or capsule, and not in the body of the lens. They may remain small and stationary for years, with very little interference with integrity of vision. If others form in after years the lens may be more or less covered with a thin shell or scale of calcareous degeneration, the only method of removal of which is by extraction of the lens. I once extracted a fully formed white calcareous cataract in a woman of forty-two years who had well developed tophi of gout in knees and small phalangeal joints of fingers and toes. This cataract was unusually large. No inflammatory process attaches to these degenerations such as occurs in gouty attacks of the iris or retina and in some of the other tissues of the eye.

It is not within the scope of this paper, but it is eminently pertinent, that some methods of treatment should be emphasized here for the relief of these dental and ocular conditions. I will presume on your indulgence to the extent of five minutes for this purpose.

These forms of gout in both tooth and eye are to be treated by two methods, local and constitutional. I will omit all detail as to local methods in each location. Constitutional methods of treatment comprise those ranged under the heads of diet and medicine.

As to diet, the invariable rule should be to cut off all foods rich in uric acid and which are unnecessary to sustain life. Take no more nitrogen into the system than will keep the urea down to the physiological level of 3.5 grains per pound of body weight per day in a man of fair activity. If the diet has been a stimulating one, a simpler form must be substituted containing much less nitrogen and more albumin. A diet of bread, breadstuffs, cereals well cooked, eggs sparingly, milk in abundance, a small amount of young meat, chiefly lamb, young mutton, and beefsteak, the white meat of fowl, little fish, fruits raw and cooked, and vegetables growing above the ground, no tea or coffee, is the proper regimen to introduce into the gouty system of a young or middle-aged individual who has a rheumatic or gouty family history with as yet an undeveloped personal history of these diseases; for we all know that certain individuals earlier in life than the quoted age of the development of these diseases—viz, in men the thirtieth to thirty-fifth years, in women the fortieth to forty-fifth years—show in the teeth and skin and also the urine manifestations of what is to come in later years. In the diet of the older individual, with a system degenerated by some systemic disease, a more substantial and more liberal diet must be allowed, in which oil and hydrocarbons may be introduced with benefit. With these persons there is always the doubtful question as to the use of whiskey—for sweet and tart wines, burgundy and port, and champagne must be interdicted. To initiate a physiological diet is easier and safer than to feed a system already the subject of degenerative change. The following bit of satire is offered by an enthusiastic anti-rheumatic dietarian: "The man who has rotted and destroyed his teeth by constant contact with the fibrous tissues of fish and flesh, for which they were not intended, is not the least likely to obtain a new set."

Under the head of medicines the aim should be to render alkaline the acid fluids of excretion. Accessory to this aim, effect diuresis to a large degree. But it is one thing to flush the system with large quantities of hot or cold water, and another thing to change the chemical character of the excreted acid salts—chief of which are the urates of sodium and xanthin. But when diuresis and alkalinity act jointly, the products of nitrogenous waste are slowly and surely eliminated. The salts of vegetable acids are preferable, as the citrates, tartrates, and acetates of potassium and sodium, which in the system are akin to the neutral salts of the alkaline earths such as baryta and lithia. Sodium salicylate is not only a powerful uric acid solvent, but is an anodyne as well, and is very useful as such. In debilitated systems

requiring a supporting treatment, salts of ferric iodid, with arsenic, hydrocarbons—chief of which is cod-liver oil—quinin, nux vomica, and strychnin, are most useful. Thermal baths, so successfully caried out in many resorts in this country and in Europe, should be advised to those who can afford them. These, in conjunction with friction and massage and enforced exercise, are of the highest avail in chronic states of rheumatic and gouty arthritis, which nearly always involve invasions of both dental and ocular structures.

Gentlemen, I cannot emphasize too strongly the watchful supervision a judicious dentist and physician should constantly exercise over patients with these chronic conditions. With their detection in early youth much clinical discomfort and deformity can be saved in later life, while it cannot but redound to our feelings of professional pride and satisfaction.

BIBLIOGRAPHY.

1. Burchard. "Text-Book of Dental Pathology, Therapeutics, and Pharmacology." Philadelphia and New York: Lea Brothers & Co., 1898.

2. Baillou. "Programme des Cours d'Histoire Naturelle Médicale," etc. Paris: F. Savy, 1878.

3. Dental Cosmos.

4. Garrod. "A Treatise on Rheumatism and Rheumatoid Arthritis." Third edition. London: Griffin & Co., 1890.

5. Haig. "Formation and Excretion of Uric Acid," etc. Monograph, Wood's *Medicine and Surgery*, 1890.

6. —— "Causation of Anemia and the Blood-changes produced by Uric Acid." London: British Medical Association, 1893.

7. —— "Diet and Food, Considered in Relation to Strength and Power of Endurance, Training and Athletics." London: J. & A. Churchill, 1898, 1901, 1902, 1904.

8. —— "Uric Acid," etc. Sixth edition. London: J. & A. Churchill, 1903.

9. —— "An Epitome." Philadelphia: Blakiston's Son & Co., 1904.

10. Litch. "American System of Dentistry." Philadelphia: Lea Brothers & Co., 1887.

11. Mackenzie. "A Practical Treatise on Diseases of the Eye." Philadelphia: Blanchard & Lea, 1855.

12. Marshall. "Injuries and Surgical Diseases of the Face, Mouth, and Jaws." Philadelphia: The S. S. White Dental Mfg. Co., 1902.

13. Norris and Oliver. "System of Diseases of the Eye." Philadelphia: J. B. Lippincott Co., 1898.

14. Fox. "Diseases of the Eye." New York: Appleton & Co., 1904.

15. Trousseau. "Lectures on Clinical Medicine." London: New Sydenham Society, 1869-1872.

16. Mitchell, J. K. "Essay on Rheumatism." Philadelphia: Blanchard & Lea, 1849.

17. Foster. "Synthesis of Acute Rheumatism." London: T. Richards, 1871.

18. Richardson, B. W. "Foods for Man and Animals." Manchester, Eng., 1891.

19. Lawson. "Diseases and Injuries of the Eye." Third edition. London, 1878.

20. Graefe u. Saemisch. "Handbuch der Gesammten Augenheilkunde. Berlin, 1877.

21. Noyes. "Diseases of the Eye." Wm. Wood & Co., 1892.

22. Swanzy. "Diseases of the Eye." Philadelphia, 1896.

23. Arlt. "Augenkrankheiten," 1877.

Discussion.

Dr. Francis Valk. I feel that I have been granted a great privilege in hearing Professor Peck's excellent paper on the pathological relation between diseases of the eye and teeth arising from rheumatism and gout; but when asked to open the discussion on the paper I have been presented with a very difficult task.

Professor Peck has covered the ground so completely that little remains for me to say. I would like to consider diseases of the eye arising from rheumatism and gout in which the symptoms may be associated with or complicated by diseases of the teeth. My principal thought since Professor Peck invited me to be present has been regarding the influence of the uric acid condition on the eyeball and its appendages rather than on the teeth, and you will pardon me if I refer to certain anatomical parts of the eye that we may better understand its relation to the teeth. I can look at this subject from the viewpoint of an oculist only, and shall be pleased to hear the dental discussion of Professor Peck's paper.

It is an interesting fact for those of

us who are students of this ocular organ which is so important to our well-being, that here we have all the various tissues essential to the body itself, together with the peculiar tissues pertaining to the eye alone. In the lids we have all the essentials of the skin, with liability to the same pathological conditions, besides those interesting minute glands, like a bunch of grapes, situated just under the lids. Then we have the space beneath the lids, lined by an extensive mucous membrane, the conjunctiva; and back of the eyeball we have a cushion of fat, muscles, vessels, and nerves. Returning to the eyeball, we find the hard outward envelope, the sclera, and inside of that the vascular membrane, the chorioid, and inside again we find that delicate perceptive membrane, the retina, on which the images of all objects within the range of vision are formed. By its nervous connection with the brain, through the optic nerve, we are enabled to see and to appreciate the beauties of the world about us. In the anterior part we find the cornea, like a watchglass inserted in the sclera, through which the rays of light pass to the retina. Before doing so they are refracted or bent by the action of the cornea and lens. The action of this lens is controlled by the beautiful adjustment of a circular bundle of muscle fibers which surround it; the contraction of these fibers increases the refracting powers of the lens.

I have dwelt thus briefly on the anatomical conditions of the eye and its adnexa to illustrate to you why the eye and its appendages may be attacked by the same pathological conditions that cause disease in other parts of the human system. Hence we may understand that the conditions of rheumatism and gout may cause in the tissues of the eye similar diseases, as well as those conditions peculiar to the eye itself. If, then, we accept these conditions, we may well ask in what way may they involve or influence or proceed from the dental conditions. I am inclined to think that we can only have these two conditions as sympathetic. I do not believe that any disease of the teeth can or may cause any pathological condition in the eye, nor can it pass from the eye to the teeth. Linnell says, "There is an anatomical nervous relation between the nose, teeth, and eye, as the spheno-palatine ganglion sends branches to the nasal mucosa, which is in direct communication with the Gasserian ganglion at the sensory root of the trigeminus, the otic, ophthalmic, the maxillary, and the superior and inferior dental ganglia; these are all united in common through the sympathetic." Thus this nervous connection is very patent for the transmission of reflex symptoms. You will note that these connections only transmit reflex symptoms which Dana says are "passing away," and that these reflex symptoms are not and cannot be those of actual disease.

Now, disease of the orbit and amblyopia, or dull vision, has been reported as having been caused by diseased teeth, but I think this is very doubtful. Furthermore, hyperesthesia of the retina, photophobia, and loss of amplitude of the accommodation have also been reported; but these conditions must be classed only as reflex. We may well understand that a diseased condition of the teeth may cause the above-mentioned symptoms, but they must be reflex only —or the two conditions are simply associated. A case of toothache has been reported as cured by putting on a pair of glasses, which only shows how far men may go in reporting certain coincident conditions without consideration of the actual facts. But we may meet pain in the eyes associated with pain in the teeth, cases that should indicate to us, as ophthalmologists—who perhaps cannot see beyond the small field of our own special work—that a dental examination at least is necessary.

There are other conditions of the eye that may justify a dental examination —such as spasm of the accommodation; local irritations, as redness of the conjunctiva; and lacrymation, or watering of the eyes. These may be due to a disordered condition of the teeth that will disappear on proper attention to or removal of the offending molar. But we

must remember that the conditions mentioned are only reflex in their character, and do not present any pathological peculiarities, nor can they arise unless the teeth are painful. I do not think they are caused simply by a diseased tooth. One of our text-books (De Schweinitz) states that in disease of the cornea the teeth should be examined, and if found diseased they should be attended to by a competent dentist. This is excellent advice. He says, further, "The frequent relation of carious teeth to corneal ulceration is well established, and the irritation of a new dentition in young children has been found to cause an abscess or ulcer of the cornea." I regret that I cannot agree with the words of this eminent physician, as I must look upon the two conditions as simply both existing at the same time, and hold that both must be due to a general anemic condition of the system.

Nuchalalgia is a term proposed by Haig to suggest the pain so frequently complained of at the occiput, and which he thinks is due to uric acid. I have frequently met the same condition due to an insufficiency of the muscular structure of the eye, called heterophoria.

I now come to the diseased condition of the eye that may be caused by the pathological conditions of rheumatism and gout in reference to the eye alone. You, as dentists, may be familiar with the condition of the teeth associated with this "uric acid in the blood"—perhaps in a way that has led you to consider or to note the eye symptoms. These cases may have suggested to you the need of the services of an oculist. As I have stated, the eye and its surrounding tissues are so similar to other parts of the body, that when the pathological condition of uric acid does exist we may readily understand how it may affect certain parts of the eye and its appendages. I remember some few years ago when I read a paper on the muscular condition of the eye, one of the speakers implied that all the conditions of heterophoria, the subject then under consideration, were due to uric acid. I am afraid the gentleman was too much an earnest follower of Haig. He would consider all "the ills that flesh is heir to" due to uric acid, and would cause us all to stop our roast beef and live upon a purely vegetable diet. It does not seem to me that the vegetarians live any longer or die any happier than the rest of us mortals.

But to return to my subject, What are the most common diseases of the eye that may be due to this pathological condition of rheumatism and gout? Outside of the eye itself we find that the eyeball has a very beautiful adjustment in the function of binocular vision, by which we are enabled to see objects singly with two eyes, and in which we have the perfect blending of the two images into one by the psychological action of the brain, as if the eyes were truly cyclopean. Now, as this adjustment is brought about by muscular action from the contraction and relaxation of the four straight muscles of the orbit, these tissues may be attacked by this rheumatic condition and the eyes become painful on the least movement. These cases are not infrequent, and do not yield readily to treatment. Much more frequently met with in our work is the disease known as iritis, an inflammation of the colored part of the eye, with its sequela, adhesion of the iris to the lens, or even occlusion of the pupil, almost destroying the sight.

I shall omit the rarer inflammations of the eyes that may be due to rheumatism and gout except to mention the condition known as embolism of the central artery of the retina, causing sudden and complete blindness from the lodgment of a small embolus in the central artery of the eye. But again we must look upon this cause as purely mechanical, as these small particles, the products of rheumatic inflammation, are cast off from the valves of the heart and are carried along by the blood current until they are finally stopped by the smallness of the bloodvessel.

Finally, we are forced to the conclusion that the relation existing between the eyes and the teeth, and that of the uric acid diathesis, is more or less uncertain, as in all the affections of the eye due to this rheumatic condition the diag-

nosis can be made only by the exclusion of all other conditions—from the fact that we can find no other cause for the inflammation of the eye. Perhaps I have taken the negative side of this question, in that I do not feel that there is any truly pathological relation between the eye and the teeth; but enough has been said to show that there may be some relation between these organs, and in our efforts to assist those who are suffering we should avail ourselves of all possible suggestions or reasons for any disease of the eye or of the teeth.

Dr. Wm. Mitchell, London. I do not know that I have anything to contribute to the subject of this very able paper, except that on the other side, where I have been practicing for a number of years, we meet many diseases of the teeth which are attributed by medical men to gout or rheumatism. It has been said that when a physician does not know what is the trouble, he says it is either gout or rheumatism.

Professor Peck has placed his subject before us very ably. I would like to hear from older and more experienced members of the profession than myself.

Dr. A. W. Harlan. I have listened with pleasure to the very interesting paper of Professor Peck and the discussion by Dr. Valk, and I must say that the presentation of the causes of rheumatism is highly interesting to me. With reference to the particular rôle that rheumatism and gout play in the development or inciting of diseases of the peridental membrane, the pericementum, and the sockets of the teeth, I would like to say that we do have concretions on the roots of teeth with an accompanying solution of the bony socket; but, unlike the concretions that are formed in various portions of the eye, we have at the same time a production of pus, which constitutes a clinical dissimilarity, provided the causes be the same for the eye as for the teeth.

We have been accustomed to think that diseases affecting the roots of the teeth have their origin mostly at the gingival margin, and that an acute attack of gout or rheumatism would not constitute the primal cause, but that we must have first some infection locally accompanied with some injury done by the patient himself or through the work of the dentist, who may inadvertently break the continuity of the attachment of the pericementum surrounding that tooth at the neck.

It is a very interesting question, and one that has not been determined by the ablest scientists who have studied this question, as to the exact cause of the various forms of diseases beginning at the margin of the gum.

The late Dr. Magitot said it was symptomatic alveolar arthritis, confirming in a degree the statement of Professor Peck that it was a joint disease. Dr. Galippe, who has studied this question considerably, and Dr. Peterwitz coincided with the view of Magitot. I think, however, that that has not obtained the undivided support of the profession. It is true that many cases of infection or of calcular deposits on the roots of teeth between the gums and the alveolar process —accompanied with the melting down of the process itself—get well without any constitutional medication. Dr. Peck said he would omit all the local treatment and would prescribe a dietary and an internal medication for such conditions. We have not found, so far as I am aware, either in the popular history or the clinical history of cases, that the concretions that are deposited on the roots of teeth ever disappear under any kind of medical treatment, but that all of those cases must first receive surgical attention before there is any possibility of a cure. It must be that in the eye, where these concretions do occur as Professor Peck has described, they may be dissipated by dieting and by alkaline and other methods of flushing the system. With the teeth, however, and the environment of the teeth, and the tissues that surround the roots of the teeth, we do not succeed by sending our patients to Carlsbad or Mt. Clemens, in dissolving any of those concretions, because we never found them in connection with the production of pus due to the agency of micro-organisms; so there is a dissimilarity, even though gout

and rheumatism may produce the same symptoms.

I therefore consider the paper of Professor Peck extremely interesting and timely. The discussion of Dr. Valk, although partaking slightly of the negative attitude, has a tendency to confirm what we know from the microscopical, etiological, and clinical aspects of diseases of the soft tissues surrounding the teeth.

Dr. T. W. Brophy, Chicago. It gives me great pleasure to be here this evening. I have been far more than repaid for coming, in having listened to the very able paper of Professor Peck, followed by the discussion. While I have given this subject some thought, I have not studied it sufficiently to contribute very much to its literature.

I am satisfied that the conditions described by Professor Peck are met with. I am satisfied that the soft parts surrounding the teeth are subject to the same conditions from the influences which bring about gout that other tissues are subject to, and I cannot understand why anyone should take an opposite view. I am also satisfied that there are pathological conditions of the eye which have origin in pathological conditions of the teeth—I think by reflex action, as Dr. Valk has said. The literature of the subject, as may be observed from the writings of Heath and other English authors, as well as our own, show cases where morbid conditions of the eye have been remedied by paying attention to the teeth. In rheumatic and gouty conditions we cannot dissociate morbid conditions of the eye from other conditions when we are considering diseases which have to do with the eye and the teeth.

I think that in any disease or condition which would involve the tissues surrounding the teeth to a marked degree—as I have observed in the destruction of bone indirectly involving the antrum and the frontal sinus and the mastoid—by continuity, the eye not infrequently becomes involved.

If we were to study diseases of teeth in relation to diseases of the eye, we would be able to point out many cases that have come under observation and treatment.

It has been a very great pleasure to find that the New York Odontological Society has taken up these subjects, which are somewhat outside of the domain of the practice of dentistry, for the purpose of acquiring the knowledge that is so much needed on the subject, besides enriching the literature of our profession.

Dr. Shaw. I would like some information regarding the condition of acid saliva. We frequently have patients whose saliva is acid as it issues from the glands. You can test it with litmus paper. My theory has been that that has been due to uric acid conditions, and I would like to ask if I am correct. We frequently find it in cases of erosion. It is not necessarily accompanied by deposits on the teeth or uric acid crystals.

Dr. W. W. Walker. We are all very grateful to Professor Peck and his colleague for coming here tonight and so ably presenting the gouty and rheumatic side of this question; but the part that pleased me most was when he spoke of the erosion of the teeth. That is what the practical dentist would like to know something about. We all have patients come to us with this eroded condition of the upper and lower teeth. We have been led to believe for the past few years that it is some kind of acid that causes it—uric or lactic or some other kind. The patient usually comes to us too late in life to start in with the water treatment or a diet. What are we to do with those people? For instance, a patient came to me two and a half years ago with his teeth fairly melting away. I sent him back to his physician for a chemical analysis of his urine, and he reported that it did not amount to much. I told him to flush the kidneys, and tried to put him on the proper diet. He came back again some time after, and said he had changed his physician, and that he now had a very scientific man treating him. This physician said there was no acid at all, but there was an alkaline condition.

What is it that causes this trouble, and how are we going to arrest it in the

teeth? We must take hold of the patients when they are young; that is the only way we can stop it. But what shall we do with the middle-aged men who come in to us with teeth almost melted away to the incisal edges?

I will tell you what a dentist in Antwerp is doing. I met him this summer, and he asked me if I had any trouble with erosion of the teeth, and I said I certainly did. He showed me about half a dozen patients. He would place the patient in the chair, clean the eroded surfaces, dry them with hot air and apply almost the same preparation that Dr. Hinkins showed here two or three years ago to tighten teeth. Dr. Hinkins would tie in the teeth and apply celluloid and acetone around the twine, which would hold them firmly in place. This man in Antwerp would dry the teeth and then take the solution of celluloid and acetone, drop it right on one of those places, and it just covered that surface. He holds it there until it dries, and it becomes very hard. He says he has had such treatment last for eight or nine months, and it proves more satisfactory than anything else. If it does not arrest the trouble, it at least retards it so that when the time arrives to put an inlay or a filling there is no sensitiveness, and you can proceed with satisfaction to the patient. While this has nothing to do with the paper, I think it is of interest to those present.

For fear that some of the members have forgotten the formula Dr. Hinkins gave us, it is 500 grains of celluloid to 155 grains of acetone. I have the formula of the gentleman from Antwerp, but have mislaid it. It dries a little more rapidly than the other. I suppose it would be about 800 grains of the celluloid and 155 grains of the acetone, and would set more rapidly.

Dr. S. G. Perry. Dr. J. Ward Hall of Shanghai told me, many years ago, that he treated some of those peculiar cases of erosion frequently met with in China—which he thought were due to the liberal use of wines there because of the poor quality of the water—by vulcanizing rubber plates to fit over the natural teeth, to be worn by the patient at night, the teeth being very thoroughly brushed and rinsed before being incased by the rubber—even being treated with milk of magnesia to avoid any possible acid action during the night. While he said he had not cured any of those cases, he felt he had held them in abeyance, and his theory can be easily understood.

You may remember many years ago I read a paper before this society on the subject of erosion, and I took the ground then—without any warrant, because I had nothing to bear me out—that those cases of erosion were due to an excess of uric acid in the blood. That was ridiculed at the time, but it seemed to impress some people with a little philosophy. So far as I know, that was the first statement of the kind that was made. From that time to this I have had considerable faith in that idea, although you will remember that Dr. Kirk has changed the situation somewhat by his investigations, and has laid more stress upon the presence of lactic acid as being one of the causes of erosion. It seemed to me, however, that there was an acid exudate from the mucous follicles of the upper lip, and possibly about the tongue, which in the quiet of night would get in its work and there would be a slight solution of the tooth just where those follicles lie upon the surface of the tooth, and the next morning the brush would remove it; but it would be like the old illustration of the steady dripping of the water on the stone, which at last wore it away.

Certain rheumatic and gouty conditions of the teeth are almost invariably associated with that condition of erosion of the teeth. We have all noticed that; perhaps I have noticed it a little more because I have been in search of evidence against it;—always be on your guard against a man who has a theory, because he will always be in search of facts to substantiate that theory. I have observed gouty and rheumatic conditions associated with that peculiar condition of the teeth, and I have ventured often to suggest that the patient should consult his physician and ask him if he would

not have careful examinations made to see if there were not those conditions present or pending. Patients have come back very grateful to me because I have made that suggestion, saying that the physician had found evidence of what was called an excess of uric acid in the blood.

Professor Peck said in one part of his paper that there could be no uric acid in the blood, because the blood is always of an alkaline reaction. Yet Dr. Haig in his works—and he has now published three—constantly refers to the excess of uric acid in the blood. Dr. Haig is such a faddist that you cannot help but feel if you read him thoroughly that he carries his fad too far. He does give some very convincing facts, however, which if they do not prove an excess of uric acid in the blood—which Dr. Peck says is impossible—do show an excess in the urine, which must be the cause of a large amount of trouble affecting the human race. He says, Do not take into your system uric acid which is found in certain foods, because you will have to eliminate it. Take only such food as is free from uric acid, and avoid those foods and drinks which contain xanthin.

For two months past I have been going without meat or fish, unless I am visiting among friends—when I do not mention my peculiarities. I have excluded tea, coffee, and chocolate because of the xanthin which they contain, and I take eggs very sparingly—not at all as I have done. I have lived almost entirely upon the dairy products—food which Dr. Haig advocates largely, and which Mr. Miles, who has written a book on brain, muscle, and food, indorses. He was the champion tennis and racquet player of the world, and was so impressed with the Haig treatment that he wrote a book on it, and maintained that he got his wonderful staying powers and great energy from following that method. He gives instances of long-distance walks between Dresden and Berlin. For myself, after two months of exclusion of meat in all its forms, I assure you I have never had such health as I now enjoy. I never felt so free from impending rheumatic tendency, and never felt so vigorous and eager for my work.

To discuss the question a little more directly: Over long years of practice it has been my belief that there are cases where there is a connection between the nerves of the ear and the teeth; but I had not supposed there was any between the nerves of the eye and the teeth. I can very readily believe that that general condition which has been described as a gouty or rheumatic diathesis might have its effect upon the teeth and the eye at the same time. It may be that many of the conditions of loosening of the teeth which have been the bane of our existence may be finally found to have a dependence upon the gouty and rheumatic conditions, although as you know I have always been inclined to believe it was due to micro-organisms more particularly than any other one cause. I believe that micro-organisms are the most potent and important factor in the causation.

I believe, as Dr. Haig contends, that many of the diseases—aside from the contagious diseases in certain forms—may be due to injudicious diet and excess of uric acid; perhaps not dependent upon diet alone, but due to lack of proper exercise of the functions of the skin, and the proper changes of the food supplies so that they may be eliminated in the proper way without that clogging which is so common in the uric acid troubles. It is also claimed that with this uric acid in the blood, ordinary colds and influenza are more liable to occur, as the capillaries have not the circulation they should have, and which they can have if you use sodium salicylate, or, again, calomel, which has the same clearing effect. But, he says, why continue to use sodium salicylate or calomel to clear it out, only to have it form again? Why not strike right at the root, and free the system by the proper selection of diet, which would seem a very reasonable conclusion.

Dr. Homburger. Having lived on a vegetable diet for about five and a half years, and coming in contact with a great many vegetarians, I have examined their

teeth and have found that there was practically no calcareous deposit on the teeth of such patients—that is to say, those who had been vegetarians for a number of years. I have yet to find a case of pyorrhea in a "long-time vegetarian." I know a number of people who have been vegetarians for upward of twenty years, and in none of those cases have I found any indication of pyorrhea or any appreciable indication of calcareous deposits, and they are not in the habit of having their teeth cleansed monthly, or even yearly, as far as I could ascertain. They are not all patients of mine, but as a special favor I was allowed to examine their teeth, so that I might obtain this information.

Dr. LeRoy. I have been thrown in contact with a number of vegetarians, and find there is considerably more erosion than calcareous deposit in the mouths of such patients.

Dr. Homburger. The Hindoos, who are purely vegetarians, are troubled with a great deal of erosion, but that is due to the mode in which they cleanse their teeth. They use a stick of wood instead of a brush, with powder, and after a few years you find a distinct furrow across the teeth, due to the use of the sticks. I met a gentleman who resided in India for twenty years. Traveling around, he was unable to get brushes, and he used the stick as the Hindoos did, causing a furrow in his teeth. It has a distinctly different appearance from the erosion we see here.

Dr. Stanton. All of the previous speakers have based their remarks on the following premise: Erosion is due to an acid slowly dissolving the tooth away. If this be so, why do we find those teeth that have melted away, as Dr. Walker has just said, hard and glistening on the eroded surfaces? In caries we have an acid solvent with the carious spots soft, due to the dissolving of the inorganic salts, leaving the matrix of the tooth. As the reverse conditions obtain in erosion, why is it not reasonable to suppose that the matrix of the tooth is first attacked and broken down, and the inorganic salts are brushed away mechanically, leaving the hard polished surface of erosion?

Dr. Merritt. If gout and rheumatism cause pyorrhea alveolaris to the extent which we are justified in believing from Dr. Peck's paper, why do not we find it more remote from the gingival margin? I think the investigations made by Talbot in his examinations of these calcareous deposits show that in something less than six per cent. he found the urates of sodium present. I think gout and rheumatism may be a causal factor, in so far as they lower the vitality, but I think in the majority of cases the cause is more local.

Dr. Peck (closing the discussion). I do not think I can add anything except hearty thanks for the variety of discussion which has been brought forth. The impression prevailed that there is no connection, nor do I claim that there is any other than reflex connection, between the gouty condition of the teeth and the eye. The cases in which the question arises are certainly not all coincidences, however, nor can they be explained in that way. The direct connection may be said to be reflex and nothing else. I call to mind a group of vegetarian nuns who were under my care as patients when I first came to New York, whose complexions—not only in the older women, who had been vegetarians for a long time, but also in the younger ones of thirty or thirty-five years—were simply marvelous.

I do not know that I am a vegetarian, or that I want to be, but after reading Dr. Haig's book, some of his allusions were exceedingly striking. Dr. Haig is a man who weighs about one hundred and twenty-five pounds. He commenced by adopting an exceedingly non-nitrogenous diet. Not only were his nervous and muscular powers exausted, but his brain power was almost *nil*. He had to abandon the course and take up the other again, but today he still shows the result. If Haig has as good a complexion as Dr. Perry, I think we had better study him a little more closely.

I am exceedingly obliged to you for the courtesy and the cordiality with

which you have received this paper. I endeavored, as I said in the earlier part of the paper, not to present anything new, but something we should think a little more about.

Dr. Tracy. I move a very hearty vote of thanks to Dr. Peck for this admirable paper.

The motion was carried unanimously.

Adjournment.

Ellison Hillyer, D.D.S.,
Editor N. Y. Odont. Soc.

MASSACHUSETTS DENTAL SOCIETY.

Fortieth Annual Meeting.

(Continued from vol. xlvi, page 1077.)

Harold DeWitt Cross, D.M.D., of Boston, demonstrator of mechanical dentistry, Harvard University Dental School, read the following paper:

Principles of Normal Articulation Applied to Artificial Teeth.

In bringing to your attention the subject of normal articulation, I am not unaware that there is considerably less interest taken in things relating to prosthetic than to operative dentistry. There is, however, great probability of our being called upon, for several years to come, to make artificial teeth; so that anything which promises to improve these is worthy of investigation.

That we may intelligently apply the principles of normal articulation to artificial teeth, it will be necessary to consider some of the conditions governing the articulation of the natural teeth. They are firmly attached to each jaw by the alveolar process, and are arranged in what is called an anatomical or a compensating curve; the upper being double, while the lower is single. The greatest extent of this curve is located at about the mesial cusps of the first molars; and the upper central incisors and first molars are the only points which will touch on a plain surface.

The canines in the normal curve are not the lowest, as they are so frequently arranged in artificial teeth, but only appear so because the festoon of the gum is higher, showing more of the neck of the tooth. Natural canines are frequently longer than is called for by a normal articulation, but in such instances, if the remainder of the arrangement be normal the articulation soon wears it to the proper length—the canine, as a rule, being the first tooth to show the effects of mastication. This compensating curve is for the purpose of equalizing the articulation during the forward and lateral movements of the mandible.

The natural molars and bicuspids are quite large, most molars being twice the size of artificial ones, while the cusps are high and sharp, with flat surfaces forming the fissures, which are correspondingly deep and well defined.

The bicuspids and molars are set at a slight angle to the median line. This inclination is present in both the upper and lower, and is most marked in the second and third molars, and causes the palatal cusps of the upper and the lingual of the lower to extend to a higher and lower plane respectively. This, together with the compensating curve, permits of contact on the side where the condyle moves forward and downward during the lateral motions.

The buccal cusps of the upper and the lingual of the lower are sharp, while the other two are dull, so that in each case a sharp cusp bears against a dull one.

There is an "overbite" of about one-eighth of an inch, in the normal arrangement of the natural teeth, without which they would not be capable of exerting the "shearing" motion.

It is this same incising motion, only doubled and with increased surface contact, that constitutes the grinding movements of mastication. The function of the incisors is still further increased by their edges, which from wear become chisel-shaped and quite sharp.

Everyone is familiar with the normal occlusion, where each tooth, with the exception of the lower central incisors and the upper third molars, are in contact with two teeth, arranged as bricks are laid, with the joints broken. During occlusion, also, the "overbite" appears, and the condyles are at rest in their sockets.

Occlusion and articulation are words often used synonymously, but which should be made to express entirely different conditions. "Occlusion" is passive and expresses rest, with the teeth in the position of the "back bite," while "articulation carries the idea of motion, and may be used to describe the various relations sustained between the upper and lower teeth during the incising and grinding movements.

While the normal occlusion is so well known, there is not the same familiarity with a normal articulation; one reason being that it is not so often seen—in fact so seldom that Bonwill expressed the idea by saying that "he could articulate teeth better than God Almighty."

During the incising action the upper and lower incisors are in contact at their cutting edges, and there is also contact of the upper and lower third molars on each side. The contact of the incisors continues as the mandible is retracted, till the teeth are nearly in occlusion, when they become slightly separated.

There is contact of all the teeth, of both buccal and lingual cusps, from the central incisors to the third molars of the same side, during the grinding motion; while on the opposite side only the buccal of the lower third molar and the palatal of the upper are in contact. This arrangement provides that, within the normal range of motion of the mandible used in masticating and incising, there will always be contact on both sides of the mouth; this is in order that the strain of the muscles on the mandible may be equalized, and also permits of greater pressure being applied.

While the arrangement of the teeth determines, to a great extent, what their articulation will be, it is really the temporo-maxillary articulation that governs and permits the movements of the mandible—which are more varied and of greater number than those of any other joint of the body. This articulation is formed by the oblong, rounded head of the condyloid process of the mandible resting in the glenoid fossa or gliding forward on to the articular eminence. There are three distinct movements provided by this articulation, besides several combinations; and the hinge, the rotary, and the gliding motions are all used, either singly or in combination, during mastication.

When the mandible is thrust forward, as in the incising action, the condyles glide forward on to the eminence, and during the grinding motion one condyle rests and rotates in its socket while the other glides forward as for incising.

As the articular eminence is at a lower plane than the glenoid fossa, it follows that whenever the condyle moves forward its line of motion must be downward also. This angle is normally about 30°. If it were not for this dropping of the condyles there would be no occasion for a compensating curve and there could be no overbite. For the angle of descent of the condyles, the overbite, the length of the cusps, and the amount of compensating curve are all proportional; that is, a considerable drop of the condyles would demand high cusps and a distinct curve, while opposite conditions would exist when the eminence was lower.

It is only within a comparatively short time that much attention has been given to the so-called "anatomical" articulation of artificial teeth. To be sure, it was several years ago when Bonwill devised his anatomical articulator and laid down certain geometrical principles in regard

to the arrangement of the teeth. It is safe, however, to say that he has not had many converts. His ideas seemed hard to grasp and, to many, equally useless to follow.

The process of "setting up" is nearly always done on a "plain line" articulator, and is often considered of no especial importance, so long as there is contact of the teeth. At the best, provision is only made for articulation in one position, while often the cusps are entirely ground away during the process: very few use rouge in connection with grinding for the articulation, so that the contact is of points rather than surfaces.

Within a few years, however, quite a general interest has been manifested in anatomical articulation—which may be regarded as one sign of a higher standard in prosthetic dentistry; so that today a set of artificial teeth not only corresponds in size, shape, color, and general characteristics with the age and temperament, but the teeth may also be arranged so as to permit one to masticate his food thoroughly and comfortably.

My purpose is to endeavor to show that artificial teeth arranged on an anatomical articulator according to the laws governing the natural teeth will restore, to a far greater extent than any other method, the principal function of the teeth—that of mastication.

The whole idea of the anatomical arrangement is simply to apply the principles of normal, natural articulation to artificial teeth, viz, to use large bicuspids and molars, to make deep fissures and sharp cusps with flat surfaces, to provide for an overbite, and arrange the teeth in the compensating curve.

But before passing to the consideration of the arrangement of artificial teeth, it will be well to note some of the conditions under which they will be used. The plates, if entire ones, are retained in contact with the tissues of the mouth, in one case by atmospheric pressure, and in the other by gravity and tolerance of the surrounding muscles and tissues.

This lack of stability is in contrast to the firmness with which the natural organs are held. Dr. Davis, in an article on articulation, quotes Black in regard to the relative amounts of force which natural and artificial teeth are capable of exerting. He says that from twenty to thirty pounds is the greatest pressure which can be obtained between the molars of an entire upper and lower set of artificial teeth; and with artificial above and natural below, forty pounds of pressure is available; while between the natural teeth the jaws are able to give a crushing power of from one hundred and fifty to two hundred and seventy pounds. This table also gives the amount of force necessary to masticate very tender beef as from thirty-five to forty pounds.

The cusps of artificial teeth, as commonly used, are little, smooth, rounded "bunches," which are frequently ground flat in adjusting for the "bite." These flat surfaces have no fissures to hold the food, and they are soon worn smooth.

Considering the comparative instability of artificial teeth; the tremendous decrease of available force; the flat, smooth cusps; an arrangement which allows of only direct up and down, open-and-shut motion—a purely crushing force—is it not a wonder that more people who wear artificial teeth are not dyspeptics?

Articulators are instruments in which artificial teeth are adjusted. They are, in a sense, artificial jaws, and if the occlusion has been taken carefully the teeth will occupy the same relations in the mouth as in the articulator. Most articulators are provided with only one movement, possibly with the idea that it is easier for the person wearing artificial teeth to learn to restrict the natural chewing movements to that of the articulator, rather than that the possibilities of the instrument be extended. However, there is a saying that there is a use for everything in nature, and it is extremely doubtful if the Creator would have made the temporo-maxillary articulation as complicated as it is, if a simple hinge would have answered equally as well.

A better name for the ordinary "plain line" articulator would be "occluder"—for that would indicate the only real purpose which it serves. Teeth arranged in

such an instrument will articulate only in the one position to which they were "set up." In the incising or grinding positions there is likely to be contact at only one point, which may be at the canines or bicuspids on one side, while there is none on the other; or the incisors will touch, leaving a space between the molars allowing the plates to tilt.

This tilting is more apt to occur when one begins to wear a plate, for after a time he learns to avoid these contact-points; or he gets accustomed to the plate; or learns to restrict the natural grinding motions of the mandible to a direct open-and-shut bite; and when this is accomplished the plates are said to "fit" perfectly.

It was the insistence on the part of one patient to have these single contact-points removed that, some six years ago, first called my attention to the subject of articulation. For two years it was my habit to articulate the artificial teeth in the mouth as well as possible, by grinding until there was contact on both sides of the mouth. This was a tedious process for both patient and operator, requiring from one to two hours; and even then the cusps were usually so flat as to be of little use in chewing. With the hope of getting better results, I constructed an anatomical articulator, and since then have used one or another of that design.

It is obvious that if an instrument can be made which will correctly reproduce the movements of the mandible, teeth can be arranged in it which will articulate in the mouth in any position in which they may be placed during the process of mastication.

A correctly made articulator is, however, only one factor in the process; it is equally important that it be used correctly. The models must be placed in the proper relation to the condyles, and also with regard to the angles of the articular eminence; and the teeth must be arranged in a normal occlusion and articulation.

The proof of the correctness with which the natural movements of the mandible are reproduced, is that models of natural teeth, set in an anatomical articulator, do articulate as the natural teeth themselves; also that artificial teeth "set up" in such an instrument give the same articulation in the mouth.

The advantages of "natural" articulation of artificial teeth are the increased facility with which mastication and incision are performed; the improved appearance when arranged in a curve, and a distinct overbite; and the entire absence of tilting during any movement of the teeth.

When artificial teeth are arranged on these principles, deep fissures and correspondingly high and sharp cusps can be made, and they will articulate with no danger of the cusps interlocking to displace the plates. The idea of the compensating curve, the inclination of the molars, and a very short overbite, may be carried out by making only shallow cusps: but one will not be able to masticate as easily as with sharp, high cusps. Even for persons past middle age it is better to provide good sharp cusps on the bicuspids and molars, while the anterior teeth may be properly aged, and still have a sharp overbite.

If very narrow molars are used, there is little opportunity to make deep fissures in them, and during the lateral swing of the mandible the cusps of the lower teeth may pass entirely beyond those of the upper, and become locked.

The normal lateral movement of the mandible is of a range equal to about the thickness of the buccal cusps of the teeth, or just sufficient to bring the lingual cusps of the upper teeth to bear on the buccal of the lower.

There are, at present, no teeth made which are just suitable for normal articulation, as they are all far too small, and it is necessary to do considerable grinding for fissures. The so-called "natural" forms, or celluloid teeth, are the nearest reproductions of the natural organs in the line of molded teeth; but there is still considerable to be desired.

The "normal" arrangement is easier to carry out when the entire upper and lower teeth are to be supplied; or when there remain in the mouth only the six anterior teeth; but the principles are

equally applicable to partials, or to entire upper or lower cases. For partials it is often necessary to grind some of the remaining teeth a little, in order to correct an original faulty articulation or to overcome changes due to long extraction.

Single teeth are, of course, much easier to arrange than are blocks; but by taking a little more time, gum teeth can be adapted nearly as well.

A very important application of the principles of "normal" articulation is in relation to crown and bridge work. When crowns or bridges are made with reference to the occlusion only, difficulties are very likely to arise in connection with the articulation, which it is necessary to relieve by grinding, or perhaps necessitating the remaking of the entire piece. Many crowns on anterior roots are loosened and fractured on account of lack of attention to the articulation.

It is not essential that a full-sized articulator be used for crown work, as there are small ones which answer nearly as well. In using these, however, it is necessary to have casts of at least one-half of the mouth.

When teeth are to be arranged for a "normal" articulation, the "bite," or occlusion, is taken in the usual manner, except for using a little more care, as there should be no grinding necessary when the plates are finished. Then, by means of the face-bow the relation of the model to the condyles is taken and transferred to the articulator. The bow also gives an approximate idea of the angles of the eminence. Suitable teeth are selected and set as nearly as possible to a normal arrangement. Dr. Gritman advises that the ten upper anterior teeth be first arranged, then the lower second bicuspids placed in proper relations with the upper, and afterward the remaining anterior teeth "set up" alternately toward the median line; then the lower molars are put in place, and lastly the upper molars. Whatever the order of arrangement may be, it is best to grind each tooth before it is put in place. A deep, square fissure is made in each bicuspid and molar, except the lower first bicuspids, where nearly all of the lingual cusps should be ground away. In the upper teeth the fissure is a little nearer the buccal, and in the lower nearer the lingual surface.

It is best to use as "long bite" teeth as possible, because they feel more natural to the patient, look more natural, and are better adapted for incising. The anterior teeth may be made chisel-shaped, if desired, that they may cut through the food easier; but if they are adapted, by a long overbite, for the "shearing" motion, there will be no difficulty in biting.

The usual arrangement should be followed of placing the greatest bearing on the bicuspids and first molars, and in leaving a slight space between the upper and lower incisors.

The following is my method of arranging teeth for "normal" articulation: First, deep square fissures are ground in both the upper and lower molars and bicuspids; then, beginning with the central incisors, the upper teeth are set up, alternately on each side, till all are in place. The lower first bicuspids are next put in position, followed by the second bicuspids and the molars; and lastly the lower incisors. It is frequently necessary to narrow these incisors in order to have the proper overbite.

The compensating curve and inclination of the molars must be kept in mind during the setting up; and after all the teeth are in place with a good occlusion, the articulation, or lateral movements, should be tried, and the teeth ground or moved as may be necessary to obtain a perfect articulation.

If the teeth in the masticating side come in contact before those on the balancing side, it shows either that there is not sufficient curve or inclination or that the fissures are not deep enough; while on the other hand, should the balancing side come in contact first, it shows that the fissures are too deep, provided that the curve and inclination are right. A very little practice enables one to determine just where the trouble is.

It is always advisable to try the teeth in the mouth, to determine if any changes are needed; but it is *not* necessary to try the articulation; for, if the occlusion be

correct, and the models are properly set in the articulator, there is very little doubt that when the plates are finished the articulation will be correct also. As there is some "give" to the temporo-maxillary joint, it adapts itself to the conformation of the teeth as a rigid articulator will not; so that, after making allowance for this adaptation, it is seldom necessary to do more than touch a cusp or two, and the articulation will be perfect, and the patient can be dismissed with good assurance that he will not need to return in a day or two with the complaint that in "biting" here, or "chewing" there, the plates tip—making it a question whether it is food or teeth being chewed.

More time is needed to arrange teeth on normal principles, but, considering their increased utility, and the fact that when once carefully made they are almost sure to be successful, it is time and pains well spent, from the standpoint of the dentist as well as of the patient.

Three entire sets of teeth were made for the same person in order to determine if there was any advantage of the "normal" over the "plain line" arrangement. I am indebted to a medical man for the experiments, as it was for him that the plates were made, and he was interested as much for science as for himself. Tests were made with definite sized pieces of Scotch oatcake and peanuts, giving the number of bites required with the different plates as compared with the use of natural teeth. The result obtained from a large number of experiments was as follows:

	"Plain line."	"Anatomical" with deep fissures.	"Anatomical" with flat cusps.	Natural teeth.
Oatcake	33 bites.	27 bites.	25 bites.	24 bites.
Peanuts	34 "	27 "	30 "	24 "

While the anatomical arrangement shows advantage over the plain line, in the mastication of bread and similar substances, the flat cusps work as well, but no better, than the sharp ones. But when used to masticate beef, the flat arrangement was at a *decided* disadvantage, as in doing this the beef was involuntarily brought forward to the canine region, in order to use the somewhat sharp cusps.

The uniform comparison of the mastication of beef is difficult, but the results both in this and in many other cases show conclusively, that in the majority of cases one can masticate it with nearly the same number of bites that are required with the natural teeth.

Normal articulation is not a panacea for all the ills of plate work; it will not make a poor model good, nor correct a wrong occlusion; it will not prevent the necessity of grinding the teeth if the flask be not closed for vulcanizing, nor give a plate "suction" when the model has been cracked by too great pressure. But by using the face-bow the models will be placed in correct relation with the condyles, so that the "bite" can be opened without causing the molars to be "set up" so long as to necessitate grinding one-half of the tooth away in order that the anterior teeth may occlude in the mouth; and the teeth will articulate in such a way as to assist in holding the plates in place rather than to dislodge them, and will allow of the easy mastication of tough foods.

Discussion.

Dr. Wm. P. Cooke, Boston. It seems to me that this method of adjusting the teeth is one of the most important things that has been brought before us in late years. The ordinary method of placing teeth in the mouth is useless compared with this method.

The subject was passed, and Dr. J. F. Hovestaedt, Boston, read the following paper:

Care of Poor Children's Teeth.

Although I have had some experience in the work of caring for poor children's teeth in the past eight years, I never had any intention of making it generally known, or of reading a paper on this subject.

Some months ago, when Dr. Samuel A. Hopkins read a paper before this society on "Study of Mouth-Bacteria," in

the course of discussing the paper I mentioned the fact that if the teeth were kept clean and in good condition it would prevent many diseases, and gave my experiences at the Poor Children's Home in Roxbury, and also that in West Roxbury.

Every American dentist who has traveled in Europe must have noticed that almost fifty per cent. of even the better class of people have neglected their teeth —even people of refinement, from whom you would not expect such neglect. At first thought we wonder at this, but it is from lack of dental education in early childhood. It is too late, in most cases, to think of saving teeth when twenty or more years of age (unless nature has been kind); this instruction must begin very early. In this country the people, at least a large majority of the better classes, have been for two generations teaching their children the scientific use of the toothbrush, and sending them to the dentist at stated intervals to have their teeth examined and necessary work done, and we professional men can well be pleased with the general results of this work. The American people, as a whole, are far ahead of all other nations in this particular, but our horizon broadens as we progress, and we find ourselves far from being perfectly satisfied. It is all very nice to see good teeth among the better classes, but how about the thousands upon thousands in our cities who, through ignorance or lack of funds, suffer continual pain and eventual loss of the teeth which God has given them? When we extract a tooth, or once in a while fill a few teeth for charity, that is by no means enough. Often we hear this expression, "We are not in business for our health, but we are out for the dollars."

How to get at the poorer class and to know just how to educate them is the great problem, and there is a great work ahead of us to bring this about. The results of a little time spent with them are most gratifying, and I want to tell you my experience in the little that I have done along this line. I shall only speak of the results in one home—the largest that I care for.

When seven years ago I first visited the West Roxbury Home, there were about fifty-five or sixty children there, all the way from two to fourteen years of age. Not one of them had ever been to a dentist, and how these poor little ones must have suffered at times with their teeth, only after examining their mouths could I judge. The pastor of the home told me how almost every day one or the other would complain of a toothache, and it was an old story with them, that with the exception of a few "home remedies" like creasote, iodin, etc., smeared all over the gums, the children continued to suffer and naturally thought that the cure was worse than the disease. Could you blame them?

At that time the home had to pay for a physician, and as in all such institutions expenses are cut down wherever possible, it was considered quite unnecessary to call a physician or dentist for a toothache, and the suffering children were told that the pain would pass away in a little while. But in such cases it is often very persistent. We all know how a child suffering with a bad toothache can keep its parents awake night after night, and it was the same there; for from eight to ten children sleep in one large room (each having its own little bed), and when one or two in a room are suffering with a toothache, the others are more or less disturbed in their sleep. And it is in this weak and suffering condition that other diseases find their entrance, as the resisting capacities of nature are then at a very low ebb.

The pastor of the home, a nice, kind-hearted old gentleman, is called by the children "father," and his wife "mother," and whoever comes to the orphan asylum calls this old couple "Waisenvater und Mutter"—orphans' father and mother.

When the proposition became too great for the old gentleman, with all his ability and "home remedies," he decided that as it would cost the home too much to engage a dentist, he would try to become somewhat of a dentist himself, and let the children have the benefit of his knowledge. With this intention in view he called on me one day, several years ago, and asked me very politely if I could not

let him have a few old "tongs or pincers," as he expressed it, for use at the home. We all have probably some old forceps that we have long discarded and are glad to get rid of; at least I had some on hand, and would have given them to the old gentleman. But when he told me that he had never extracted a tooth before in his life, and how he was going to try them on the poor children, I at once decided not to let him have them, and offered to come out to do the necessary extracting of teeth myself.

I had been attending, at that time, some poor children's teeth at a Catholic Home in Roxbury, and although it was a poor institution it was regularly attended by good physicians, and the good sisters, when any child suffered from any kind of pain, consulted them. I thought I would find about the same state of affairs as in the other orphans' home. But I was greatly mistaken, for when I first came to the place I found a large old-fashioned farmhouse, very poorly furnished, not like the other with nicely painted walls, carpeted halls and rooms; also the school, dining-room, and bedrooms were very plain, and the clothes of the children were very poor. However, the home has one great advantage, in that it stands on a hill surrounded by many acres of land and wood, and the food the children get is good and wholesome, and they have plenty of God's fresh air.

It will interest you, gentlemen, to learn by what gifts a home like this exists, and I will read to you a few lines from the annual report of this home: "Two old pairs of shoes from Mrs. Smith, 1 basket of bread and cake from Mr. Blank; 25 cents from Mr. Blank, etc." You may now understand how it was that none of the children had tooth-brushes, and that I found their teeth in a deplorable condition—badly decayed teeth, exposed pulps, fistulous openings, abscesses, bad articulations, irregularities, and trouble of all sorts.

At my first visit I extracted all teeth that could not possibly be saved. I extracted sixty-six teeth that afternoon, most of them being temporary teeth. At my second visit I made a thorough examination of the children's mouths, to ascertain which needed treatment and filling the most. Appointments were made, and regular visits of the children were made at my office every week, on Thursday mornings. I insisted that every child should have its own tooth-brush, and showed them how to use them.

I find that if we would teach our patients the proper use of the brush, our work would stand the test better. It is surprising how few people use their brushes properly. It is not always the mouth-washes and tooth-powder that bring the result, but the simple ability to use the brush properly. Good soap and water is in most cases quite good enough for children. It is too bad that there are comparatively so few physicians and nurses who will pay attention to the cleanliness of the mouth, and who fail to realize the comfort the patients would feel while confined to their beds, and, what is more important, how frequently it would prevent other complications.

What I chiefly want to point out now, in my work at the home, is that it has really taken me years to get fairly satisfactory results. Every year about twelve children, after their confirmation, leave the home to face the world, and as many more younger ones take their places. The first year after I cared for their teeth, only about two of the twelve children when leaving the home had fairly good teeth; two cases were irregular, and could not be regulated in a short space of time, but, as I had so much work and there were so many children, I had to be satisfied to let them go into the world to earn their living, knowing that their mouths were at least clean and all teeth properly filled. Only this year has every one of the young people leaving the home had an almost perfect set of teeth. When they laugh it is a pleasure for everyone to look at the display of sound teeth, and if any dentist should examine their teeth, very few fillings could be found. These results are brought about only by early care; that is, when the deciduous teeth were still in position, great attention was paid to the eruption of the permanent

teeth; and if, as is the case in so many children's mouths, there was no room for the first molars, these teeth were extracted in many cases. I say first molars, but in some cases other teeth were taken out. I want to say right here, that in no case was a tooth taken out where it was needed and could be filled. I had a good many treatment cases during the first year in order to save the teeth of these children.

Fortunately, I have never come across any of these children with badly deformed mouths, as lambdoidal arches, saddle-shaped arches, or prognathism from thumb-sucking, etc. I have, in the regulating line, treated only a few simple cases, and hope that in the future such work will not be needed, as this would take a great deal more time.

For filling materials, I have used mostly gutta-percha and cement, and very little amalgam for the molars.

In former years diphtheria and many other diseases have been prevalent at the home, but for some time past not a single disease of the kind has been recorded. In keeping the mouths of these children comparatively clean, and as free as possible from micro-organisms, we greatly assist nature in her work, increasing the power of resistance to a large extent. If children are taught at an early age to brush their teeth properly (I do not mean simply for them to go through the motion), that pleasant feeling of cleanliness, that indescribable refreshing sensation, will become to them one of the "body delights." Children who have had faulty training, whose environments have been of the very worst, when they are shown the value of their teeth and the necessity of caring for them, often receive these early impressions as seed that falls on fertile soil, and are influenced by them through life.

I will now read you a letter from the superintendent of the home:

WEST ROXBURY, April 3, 1904.

Dear Doctor,—If the inclosed record is of any use to you, I shall be pleased at any time to vouch for the correctness of the following statement or record:

Since the time that you have taken care of the children's teeth in our institution, the health record has been remarkably improved. There has been no more typhoid or diphtheria. For this we have to thank, in the first place, God, but it is also due to the scientific and conscientious work you have done for the children. The doctor's and drug-store expenses for the past nine years have been as follows:

1895	$89.97
1896	70.94
1897	49.78
1898	45.61
1899	303.39
1900	38.29
1901	2.88
1902	3.80
1903	8.86

The reason that the expenses were so much higher in 1899 than in the preceding years, was due to the fact that two newly arrived children had brought the measles and whooping-cough into the institution, and eighteen children were affected by same; the sum includes pay for nurse. The great decrease in physician's and drug expenses is most markedly shown by the last three years, as the same have been reduced from $89.97 in 1895, to $2.88 in 1901, $3.80 in 1902 and $8.86 in 1903.

REV. F. WILHELM, *Supt.*

I think that we all realize, gentlemen, that sometimes the average patient, and oftentimes our best educated and most refined patients, are grossly ignorant about the care of their teeth. I think that we should all feel some responsibility in the matter, and do all we can to help these who, through no fault of their own, have never been taught the first rudiments of the care of their teeth.

Discussion.

Dr. W. P. COOKE, Boston. I have great admiration for the man who will give two hours a week, every week the entire year round, thereby possibly losing five hundred dollars or a thousand dollars each year in his private practice, to take care of these children's teeth. I take off my hat to any man who does that, and Dr. Hovestaedt has done that, and he is doing an admirable work in teaching these children to take proper care of their teeth.

Adjourned.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

Monthly Meeting, October 1904.

The First District Dental Society of the State of New York held a regular monthly meeting on Tuesday evening, October 11, 1904, at the Academy of Medicine, 17 West Forty-third street; the president, Dr. Henry D. Hatch, in the chair.

Incidents of Office Practice.

Dr. S. G. Perry. Quite a number of years ago I had occasion to call the attention of this society to certain glass points for the packing of gold. I have used those glass points from that time to this, only using them against very thin walls, where pressure would not be permissible, and they work very well. They do not catch on the gold as the ordinary steel burnishers do. They were suggested to me by the use of Dr. Shumway's ivory points. Since the method of making our inlays came into use, I have used those glass points for burnishing the gold and the platinum, and they are very nice for that purpose. In the presence of several gentlemen, a few nights since, I had occasion to speak of them, and to my surprise no one present seemed to know of them. So I thought it might be worth while to call attention to them again, because they can be so easily made by anyone, and they are very valuable for that sort of work. They are made of pieces of glass tube, which you can get at the druggist; put one end in a blowpipe flame, soften, and draw out; then hold in the flame and a little ball rolls up on the point. This makes a nice ball burnisher. You can get a variety of shapes to the points, so that they can be adapted to various positions in the mouth. Of course, the material we use —the thin gold or thin platinum—is so very soft and plastic, and requires so little force, that they do not break when put to such use. They are so very smooth that they do not catch and drag on the gold, as the steel burnishers do.

Porcelain in Dentistry.

Dr. N. S. Jenkins, of Dresden, Germany, then made the following address:

Mr. Chairman and gentlemen: To my great regret, pressing engagements have forbidden the writing of a formal paper, such as ought to be presented to such a distinguished society as this. Unfortunately it has not been possible for me to do this; and I therefore crave your indulgence while I speak to you upon a subject which is very near to my heart, and which I believe at the present moment is one of the most important which can engage the attention of an intelligent practitioner of dentistry.

There are those present who have seen the development of our profession from its crude beginnings to its present high station. There are those present who began to study dentistry when it was regarded only as a mechanical art. However humiliating that may now seem to us, it was a natural and a fortunate beginning; for our profession is founded upon a knowledge of mechanics. In its early beginning, the men who achieved reputation, who added to the progress of our profession, were men who by nature and by training were skilled in the mechanical arts. There is no other branch of medicine which is so dependent upon a knowledge of mechanics. There is no other branch of medicine in which that fine training of the brain, the nerve, and the hand, is so essential as in our profession.

But there came a time when, through the influence of those gifted men who

established schools for the instruction of dentists, a broader spirit and a finer intelligence pervaded our profession—for a profession it was from the very beginning, although at first only a handmaid of the great profession of medicine. And after a time there came a surprising discovery growing out of our profession—the discovery of anesthesia, the greatest boon to suffering humanity which we have ever known; that great discovery which, in the eloquent words of Oliver Wendell Holmes, made "the knife of the surgeon to pass through the waters of forgetfulness."

Then there began a new era in the development of our profession; the era of oral surgery, illuminated by men like Garretson, and in our own time by men like Brophy. After a time there came to us the great illumination of antisepsis, and of the new theory of the bacterial origin of disease, and the new science of bacteriology attained new luster through the name and work of our beloved and revered Miller.

So, gradually, this handmaid of the great science of medicine has made its way in the world, until, from the crude mechanical beginning, in our day the scientific and skilled dentist finds no disease of the oral cavity which he is not capable of treating, and he obtains results so amazing that the most enthusiastic dentist in the beginning would scarcely have deemed them possible.

Now dentistry is approaching the dawn of a yet further advance. We have learned through the studies and discoveries of men of genius in the past how to treat and how to overcome the ravages of disease in its ordinary manifestations; but at last there has come to be a demand for something more than the simple curing or repairing of disease conditions. It is demanded of us that we shall not only cure disease, that we shall not only make our patients comfortable and healthy, but that we shall restore them to that symmetry and to that beauty which nature originally stamped upon them before disease had made a lesion in their condition.

Long ago, this idea of restoring purely natural conditions had occurred to certain gifted men. In prosthetic dentistry, long years ago, Allen, Kingsley, and other men of supreme talent and ability seemed more than their fellows to have succeeded in restoring by prosthesis the destruction of the natural organs, so that they were represented by perfectly natural and indestructible substitutes; but it was a labor far too difficult, far too complicated, requiring too high a development of both the artistic and mechanical senses to be applicable to the great majority of practitioners.

Long ago, men like Rollins and Land saw what was possible in porcelain restoration, in the case of broken and diseased teeth. Their first experiments were crowned with unexpected success, even to themselves; but the time was not ripe. The profession was not ready to receive the good tidings which those men brought to the world. We were still too much occupied in the mechanical development of dentistry. We had to evolve the rubber dam, cohesive gold, the dental engine—innumerable appliances which to you younger men seem perfectly natural, but which have been only evolved by the gradual progress of our profession. They could not spring out at once, like Minerva fully armed from the brain of Jove. They had to be gradually evolved. Our profession would not be what it is today, had it not been that by slow process all these great improvements were evolved.

But the seed which those pioneers sowed bore fruit. Here and there throughout the world men began to make broader use of porcelain. Here and there there was an exceptionally skilful and enthusiastic man, who began to cry aloud in the wilderness that a new day was dawning for the practice of dentistry; that the operations which had hitherto been conducted with such pain and stress both for the operator and the patient were to be superseded by operations which should be vastly easier for both, and which should be far more harmonious than previous ones.

If you will permit me to use a personal reference—these things had made

upon the practitioners in Europe, and I think especially upon me, a deep impression. A European practitioner is in a different position from an American practitioner. No two of you have exactly the same practice. No two of you treat your patients in exactly the same way. No two of you have the opportunity of observing in the ordinary course of your practice how cases are treated by the most eminent men of our profession. A European practitioner, on the other hand, has a certain great advantage. It is true he is isolated from intimate and personal communication with those great lights of our profession in America who are always holding aloft the torch of enlightenment; but he has the great opportunity of having passed under his observation representations of all the large practices in the world. He has the great advantage of seeing how this or that distinguished man has treated his patients from the very beginning. I know of no school so instructive, and from the very bottom of my soul I wish to express my thanks to those distinguished men in this society who have been my instructors, in sending to me or in allowing to fall into my hands representations of the methods with which they have carried on their practice, and through which they have obtained eminence.

Long ago, I began to see that there were men who had made side by side operations in porcelain and in gold, and to my astonishment, when I inquired of the patients what was the length of time that these operations had stood, I frequently discovered that the operations in porcelain were not only of the most distant date, but they were frequently far more efficient in the preservation of the teeth than had been the most brilliant operations in gold.

Accordingly, I began experimenting in making porcelain inlays and in making porcelain restorations myself; and I found that for my ability the ordinary methods were inadequate. I could not make a satisfactory restoration with a platinum matrix and with high-fusing porcelain; and accordingly I said, however humble and insignificant my abilities may be I must represent in a certain measure the ordinary practitioner, and what is so difficult to me must be difficult to the general practitioner. There must be a way out of this difficulty. And through the experiments which had been already made in Europe—particularly through the distinguished Professor Sachs, who had proved the exceeding value of the gold matrix in making glass inlays—I came to the conclusion that it must be possible to make a porcelain which should be fit for melting in a gold matrix, and which should be able to resist the disintegrating influences of the mouth.

I entered upon this task with a certain light-heartedness, such as proverbially belongs to those "who rush in where angels fear to tread." But little by little I discovered how difficult it was to attain my object, and set to work seriously to make a study of the question of ceramics.

After a considerable time, it was possible for me to evolve a material which could be melted in a gold matrix, and which would withstand the deleterious influence of the fluids of the mouth and the stress of mastication, and upon announcing this discovery, to my great delight it met in Europe with a very wide acceptance. Why it should have been so immediately accepted is to be explained by a knowledge of the character of the ordinary European practitioner. We Americans who practice in Europe are but a handful. We are very few amongst the native practitioners, and our education and training has been in many respects very different from theirs. The European practitioner has been educated in a more exact and in some respects in a more strenuous way. He has been taught logical habits of thought; taught to respect authority. I presume that those among you who have had anything to do with the instruction of students have often been astonished to find how intractable in certain ways the European student was. He is accustomed to demand an exact formula. He is accustomed to expect that he is to be taught

after a direct system, and that the authority which instructs him shall be infallible.

Now, in the use of gold in filling teeth, you know there is no such thing as formulating it so that it can always be done successfully, after a model. Its success depends upon the ingenuity, upon the mechanical ability, and upon the intellectual resource of the operator.

Moreover, to the European mind the making of a gold filling in a diseased tooth is a perfectly illogical proceeding. It subjects the patient to a prodigious strain, and is an immense strain upon the operator. It puts a stop in the great majority of cases to the ravages of decay, it is true—always, however, at a very great expense—always with a certain uncertainty.

The dreadful misfortunes which follow "the little rift within the lute" are familiar to every practitioner. When once the decayed portion of a tooth has broken down, and moisture enters between the walls of the cavity and the gold filling, no one can tell what disaster may follow. Moreover, after being completed in the most perfect possible way, a gold filling is a source, in a vital tooth, of almost unremitting annoyance to the patient. However great the advantage in the preservation of the tooth, the patient is constantly aware that that tooth has once been a diseased organ, and has been imperfectly restored to usefulness. Last of all, in visible cavities its color is an offense.

In the European practice all those objections are more accentuated than in an American practice. It may be partly because European patients are more sensitive. It may be partly because European patients are more offended with that which is contrary to esthetic taste; but from whatever ground it may arise, the fact remains unquestioned. European patients are the most docile, the most grateful, the most tractable patients imaginable. It never occurs to a well-bred European patient to question the authority of the professional man whom he consults. From the very fact that he goes to a doctor, it is understood that he places himself unreservedly in his hands; but if ever he approaches a suggestion of revolt, it is for the reason that he feels he is disfigured.

Therefore, when porcelain enamel, melted in a gold matrix, was first brought to the attention of the ordinary practitioner, when through his method of practice it was made perfectly practicable for him to make restorations of an enduring character, he accepted it with avidity.

Long years of labor and absolutely unlimited outlay of money was to me fortunately a matter of minor consideration. It chanced that I was so situated that in my country home I had exactly at my command everything which an investigator could require. A thoughtful sculptor, who had prepared the house and the grounds in which I live, had been good enough to erect a sculptor's studio, which was exactly a perfect smelting-house; and in his painter's studios he had thoughtfully provided for me, far away from dust and soot and all the annoyances of the town, perfect room for laboratories and for grinding rooms, and for all the purposes one might require in pursuing such investigations.

I had also at my command friends who were among the most distinguished ceramic chemists and experts in the world, and it was therefore easy for me to make the investigations which I had in view. And it was to me a source of very great satisfaction when at last I was able to obtain that which was in my own practice a matter of great advantage.

But far beyond that has been the satisfaction which I have gained from the testimony of my European colleagues, throughout the length and breadth of the European continent, of the great advantage it has been to them, not only in emancipating them in so great a degree from the things which they so greatly dreaded and disliked, not only that it had been for them and their patients a matter of so great importance in their professional relations, but because in a profession which throughout all the world is overworked and underpaid, it has made it possible for so many men to add so largely to their revenues. For in

the application of porcelain to dental practice it is not only possible, but most proper and just, that the remuneration should be adequate to the skill, intelligence, and artistic taste necessary for its proper application. That has been to me a source of unlimited satisfaction. Their revenues "have the general coffers filled," and many times a European colleague has come to me and said: "But for you I should have remained all my life upon the very verge of starvation." Gentlemen, that is a very great satisfaction, to have been able to help a colleague so far.

I beg your pardon if I seem so much to dwell upon myself, and to speak egotistically. Believe me, I would avoid it if I could. But it is not possible for me to present this subject to you from any other point than the personal one. I would say again what I have repeatedly said, that it is not I. No, it is the labor of men vastly more competent, better trained, and more able than myself, whose labors I have been able to assimilate, whose labors I have been able to direct, and whose work I have been able to collate.

After having seen what a revelation was brought to pass by the introduction of a porcelain which could be used by the ordinarily intelligent dentist in the restoration of the natural organs, I naturally reverted to the prosthetic problem. All of you are acquainted with the ordinary methods of making crown and bridge work, and of making plates for the restoration of broken or lost teeth; and you know how unsatisfactory and unesthetic most of those methods are. It is true that here and there there has been a man of genius who could carve and bake porcelain teeth of any form and any color he liked. Only today, in the office of our venerated and distinguished colleague, Dr. Kingsley, I have seen blocks of porcelain teeth carved, I believe, fifty years ago, which are models of anatomical excellence and of mechanical and ceramic perfection. But operations of that kind were possible only to the gifted few.

How could the ordinary dentist, with the cares and strain of practice, think of such a thing as perfecting himself in the proper manipulation of those very uncertain bodies—the so-called high-fusing bodies? Feeling the want of this in my own practice, and being sure that —if it could be so supplied—the ordinary practitioner could make crowns and bridges of porcelain and continuous gum work with a certain ease, I set myself to work to discover a porcelain which should melt below the melting-point of gold. This is a matter I believe to be of the greatest importance. So soon as one exceeds the temperature at which gold is melted, one comes into realms of temperature which are not easily controlled, and even the greatest expert is often handicapped, even though he works with a pyrometer, and is never certain of his results.

It seems to me that what we needed in order to make porcelain crowns and bridges perfect, and what we needed in order to make continuous gum work a perfect thing, was not a material like the artificial teeth with which we are familiar —which compressed and subjected to heat assumes a certain form, and, the heat never being carried beyond the point necessary to bring it to crystallization, remains a perfect mass; but a material which should attach itself to those teeth which are given to us in such great variety by the manufacturers, and attach themselves to a platinum base, so that they should be immensely supported, and not only be freed from any danger of fracture, but be kept in an aseptic condition, and represent to all outward appearance the natural organs.

It is not a very easy matter to make a porcelain which shall be sufficiently elastic for this purpose, which shall unite with all porcelain teeth—for the teeth of every manufacturer have different degrees of expansion—and which shall flow at the same time upon a platinum-iridium base, whether thick or thin, and perfectly surround pins attached to that base, whether they are of small or great diameter, and be of that perfect texture throughout and have sufficient strength to afford an indestructible basis, and a surface which may be kept perfectly clean. It was only possible by using an

excess of kaolin. Kaolin is one of the most extraordinary substances which nature furnishes us. Its properties are as yet not perfectly understood, although for thousands of years it has been used as the essential basis of porcelain work; but I have found that by its proper preliminary treatment, and by its proper uniting with the other essential bodies—feldspar and quartz—it may become almost homogeneous.

Now, the time comes when in the course of the process it seems to be completely absorbed in the other ingredients, and there are times when it is necessary to leave it in suspension; but through the elaborate processes which I have at last evolved, it imparts that degree of elasticity to the porcelain of which it is the essential basis, which prevents that porcelain from cracking or from having blow-holes or bubbles when subjected to the proper degree of heat, and which permits it to flow into the finest crevices and attaches it to the most unlike porcelain teeth without showing any signs of disintegration.

It is to my mind a remarkable product, for by its use in any denture or any bridge, teeth of the most varied manufacture may be used and so united together that they form one solid and indestructible mass.

As an illustration, I would like to pass among you some specimens which have grown somewhat meager in the time I have been in America. I am sorry there are so few of the crowns and bridges. They will show to you what the system is, and how it can be most advantageously employed. This material begins to melt at a temperature of 950° C. Its complete fusion is accomplished at 1000° C. That is—according to the best German authority—75° C. below the melting-point of gold. This is of the greatest importance. I do not know how it may be with all of you who have experimented with soldering platinum-iridium with platinized gold; but I have been told by some experts that not only was the soldering of platinum with platinized gold a matter of considerable difficulty, but its strength was not sufficiently great. I suppose we all know that the use of pure gold as solder is a very great convenience in such prosthetic work. It is not only perfectly manageable, but it is very strong. A porcelain which is designed for prosthetic purposes ought to melt below the melting-point of gold, if for that reason only; but there are other reasons. In the first place, it is far easier where one has not all the appliances of a perfectly appointed scientific laboratory at one's disposal, to work with a material which melts at a point which can be easily gaged by the eye. Temperatures which considerably exceed the melting-point of gold are excessively trying to the eyesight; whereas in an electric furnace which never carries its heat above the melting-point of gold, the glow is by no means excessively trying to the sight. Moreover, in such cases as long bridges or in continuous gum work, a case which is subjected to a heat by the addition of porcelain below the melting-point of gold need not be embedded. It does not warp or change. When a bridge has been made upon a proper basis of platinum-iridium, and prosthetic porcelain is melted upon it at 75° C. below the melting-point of gold, that bridge, however long and involved it may be in its form, will be found afterward to exactly fit. It has undergone no change.

This material is the same throughout. It is not biscuited or fritted below, and then covered with a low-fusing porcelain above. It is one solid mass, the same from base to outermost periphery. That is also a very great convenience. Not that a so-called high-fusing porcelain may not also be melted to one solid mass throughout, but it is not so easy to accomplish. It is surrounded by difficulties and dangers from which this new material is exempt. The latter flows into the finest crevice. It makes a mass so solid that one has no anxiety that it may afterward become offensive through absorbing fluids or gases. It has what porcelain workers call the true feldspar glaze—a glaze so hard that it withstands mechanical abrasion, and is absolutely indissoluble in the fluids of the mouth.

All of you who have had opportunity to observe the ordinary continuous gum work such as was made thirty years ago, will remember how frequently those cases became offensive—of course nothing like so offensive as is the case with vulcanite, but sufficiently offensive to be most disagreeable, particularly if any of you have had occasion to repair such cases—you will have wished that the original maker of the case had never been born.

It has the great advantage, also, of being so strong that it can support a very thin facing or a very thin segment of a crown for occlusal purposes. Among all the admirable teeth which are manufactured throughout the world there are none which for certain purposes are more useful than the so-called English teeth, and for the reason of their great density. There are places where the uniting of so-called English and so-called American teeth in a bridge or a denture is a matter of very great importance. To be able to unite them by a porcelain which is harmonious to both, and which enables one to get the advantage of both kinds of teeth, is no inconsiderable benefit.

This porcelain is extremely strong. A piece 1 centimeter square and 3.6 millimeters in thickness has repeatedly endured a crushing strain of considerably more than three thousand pounds. That makes it possible for a crown or a segment of a bridge to be made, in a close bite, of no more than 3 millimeters in thickness, which will invariably endure all the strain that can possibly be brought to bear upon it.

This is a matter of very great importance in close bites. There are innumerable instances where the only chance for restoration, unless one uses such materials as this, is to be found in a gold cap or building up a crown—both of which are disfiguring and unhygienic. As a base for plates, for caps, and for those cases where bands are admissible, platinum-iridium I have found —of 10 per cent. iridium—to be most valuable. With this alloy of ten per cent. a plate can be rolled out to great thinness. You may use for caps and for bands, and still retain the necessary stiffness, a very thin plate of ten per cent. platinum-iridium. For upper dentures, in particular, a thin platinum-iridium plate is a matter of very great importance. Not only is it far more agreeable to the mouth than a thick plate of gold, or of platinum or of platinum with five per cent. iridium, but it is so stiff that one has no necessity for covering the under side of such a plate with porcelain for purposes of additional strength. Patients who have worn an upper denture made of thin platinum-iridium with no porcelain surface, have found them vastly more comfortable than the thick and heavy platinum porcelain plates which were formerly in use. Moreover, enunciation is far more distinct, and the sense of taste is more perfectly preserved.

When one comes to the question of putting pins into roots for the purpose of sustaining crowns and bridges, a ten per cent. alloy of iridium with platinum is insufficient. It requires a twenty per cent. alloy. That gives an exceedingly stiff pivot—a pin which will neither bend nor break—always providing that it is appropriate to the caliber of the root, and to the strain which the artificial tooth or bridge has to endure.

It may be possible that in time we shall discover that a yet higher per cent. of iridium is desirable; but from the experience I have had during the past two years, I think I am justified in saying that in all probability twenty per cent. iridium-platinum is sufficient.

This work can be done so perfectly, with attention to the original requirements, that no human being except the dentist, and often only he by careful examination, can detect that the crowns of the teeth have been lost.

One of the great advantages of this method is found in crown work, in the ability to dispense almost always with bands about the root. The skeleton is so stiff and the adaptation of the tooth to the skeleton and afterward its padding out with prosthetic porcelain so perfect, that when once such a crown is set, the gum festoons kindly cover it, and

it has all the appearance of a natural organ, with the partial exception that now and then it is a little more beautiful that the original was.

I have only to add, gentlemen, that in my opinion—just as porcelain for the restoration of the natural teeth to their original beauty and to more than their original immunity to decay—just as that has wrought a revolution which is tending to a still greater development throughout dental practice in all the world, just so the popularizing of prosthetic porcelain work is destined in that branch of our profession to work a revolution. We have no right whatever to make the restorations in the mouths of our patients an offense to the esthetic sense.

Discussion.

Dr. Perry. In my judgment, the sum and substance of this beautiful address is contained in the last sentence. That sentence should be inscribed in some permanent form as a text wherever dental meetings are held. It embodies a doctrine I have begged for and hoped for all these years—that the display of gold in human mouths shall never be. I think that is the most eloquent sentence I ever heard Dr. Jenkins utter.

Dr. Norman W. Kingsley. This subject is of more interest to me perhaps than to any one of you. Nearly forty years ago I wrote a series of articles with a very ambitious title. I do not know that they were worth reading. I think perhaps I wrote in advance of my time. The title was "Dentistry as a Fine Art." I had artistic aspirations, as many of you know, and was constantly impressed with the idea that there was something more in dentistry than simple mechanism—that dentistry as a fine art was something in the future—and I wanted to work and preach for it. I was in the New York College of Dentistry then, and I used to deliver some addresses which ran a little on that line. I do not think they were appreciated. An editor of a journal in Philadelphia, who has passed away since, wrote that my lectures were "simply discourses of morbid sentimentality." But that did not deter me. I kept on in the same way. I have felt even more strongly, I think, than Dr. Perry has spoken, of the unesthetic appearance of the restoration of the natural teeth by gold or any metallic filling; so I hailed with great joy the efforts of Dr. Jenkins to produce a porcelain which would be more in harmony with the color of the teeth, and equally indestructible.

About ten years ago, when he talked with me at his home in Dresden, I doubted whether it was possible. I knew there was a great difficulty to overcome, and I doubted whether he would ever accomplish it. I felt so at the time, although I told him to go ahead; but I thought he would get tired of it. As year after year I went over and found him making progress, I began to think he had accomplished it, and now I believe that everything he has claimed for porcelain for filling teeth and for prosthetic purposes can be fully carried out. Anyone with esthetic taste can realize that it is a great advance over everything we have ever had. This prosthetic porcelain which is his latest venture I have used recently, and am very much pleased with it. It is easily worked. I can claim for it more than he does; but I will not state that here. I have done some things with it which these specimens do not show. It has abundant strength, and so far as beauty is concerned, there is no question.

It has been said that the highest attainment of art is the concealment of the art. That is attained in this way as in no other. I was anxious that our profession should be regarded as an artistic profession. The distinction between dentistry as a fine art and as a mechanical art you will understand readily—that the methods must conceal the art. This porcelain of Dr. Jenkins certainly does it. You have undoubtedly seen fillings you have made yourself, of porcelain, which no one would detect in the ordinary observation of the mouth. A person in conversation with such a patient would not suspect that the tooth had been filled. That is the highest possible at-

tainment. It has fulfilled my ambition of forty years ago, that of dentistry as a "fine art," and I congratulate Dr. Jenkins upon being its great apostle.

Dr. Chas. F. Ash, Brooklyn. I am very glad to have heard Dr. Jenkins' remarks. I think I saw the first outfit of Dr. Jenkins' porcelain inlay work in Dr. Kingsley's office. I believe it was one of the first Dr. Jenkins sent to this country. I took it up from that time as quickly as I could get an outfit. I have never gone extensively into the matter of making all-porcelain bridge work, but what I have done has been very satisfactory in wear and appearance. In the restoration of broken-down teeth, however, it is valuable. I must say I do not think anything has ever appealed to me in dentistry as has the art of restoring teeth with porcelain.

I have found more difficulty in the matter of shrinkage, I think, than in anything else during the early experience with porcelain. I think perhaps the Jenkins porcelain has a greater shrinkage than almost any of the other porcelains on the market—a great deal more than any other I have used; but you can overcome that slight disadvantage with a little experience. The beautiful results which were attained, and the strength of the porcelain, more than compensated for any little trouble I had.

I think one mistake has been made by some people who have taken up this subject and condemned it, on account of the fact that they have tried to hurry with it. They have heard some essayists say that it is easier to make the porcelain fillings—for the patients; that you save them the trouble of hammering, and being tied up with the rubber dam; that it takes about three minutes to make a porcelain filling, while to make one in the chair with gold takes four hours. It sounds very nice, and you try to do it with the patient in the chair—and the next patient coming in in about half an hour; perhaps you use a little heat for the cement to hurry it up; you put it in, the patient goes out, and so does the filling!

The only question that has bothered me in connection with this porcelain work is trying to set them in a hurry. In putting in an inlay, as soon as I thought the cement was hardened I took off the rubber dam and let the patient go. Now I put the inlay there, and hold it under pressure until I believe the cement has crystallized. Then I leave the rubber dam on for at least half an hour longer; and I have no trouble with the inlays coming out.

Dr. John I. Hart. It has been a privilege to listen to Dr. Jenkins' remarks this evening. He opened his address by apologizing for failing to prepare a paper. He is too modest; he requires no apology. I have heard Dr. Jenkins deliver several addresses, and I think his effort tonight has been far more elevating than any remarks I have heard him utter. His literary achievements, his mechanical skill, his artistic ability—in fact the whole subject is treated by him in a manner that is uplifting. It is bound to advance dentistry in a manner that I think few of us realize. It is going to place certain branches of our profession many steps forward. I think that there is very little to be said, because the subject has been presented in a manner that is complete. We can express our appreciation warmly and heartily, but the picture as painted, the idyl as presented, is too complete to be added to by any remarks I am capable of making.

Dr. R. M. Sanger, Orange, N. J. I am very greatly impressed with what Dr. Jenkins has told us tonight. It unfolds to my mind a future of dental prosthesis that we at first glance fail to grasp. It is along lines that have been to my mind desirable for many years. I have made attempts to construct a satisfactory porcelain bridge with indifferent success, because of the inability to find a porcelain which I could with certainty unite to porcelain facings and porcelain teeth already made, the line of attachment between the facing and the new porcelain being a line of weakness instead of strength, as Dr. Jenkins has said, and my work has met with failure. It has been a hobby of mine that gold displayed

in the mouth—in the form of crowns, bands, and bridges with great gold bars —is a disgrace to a profession which holds its head up and claims to be esthetic; and, Dr. Jenkins, the door which you have opened places you, sir, among the great leaders of our profession of the present day.

Dr. M. S. Rhein. It is a great pleasure for me to add a word to what has been said so well by the other gentlemen, in regard to our distinguished guest. On a number of other occasions in this room I have taken the greatest pleasure in testifying to my admiration for the greatness of Dr. Jenkins' work in this respect. I can only repeat what I have said upon those occasions, in reference to the great debt which dentistry owes to Dr. Jenkins. He has added to the wreath with which the dentists of the world have crowned him another laurel, in this latest use we can make, in prosthetic work, of the preparation he has presented to us.

I want to add one other thought in reference to Dr. Jenkins; one that has always impressed me more than anything else, and which in my estimation places the real stamp upon him; and that is, the inestimable human love that he has for every dentist, no matter where he lives or where he hails from.

Dr. W. D. Tracy. A thought that has come to me while I listened to these remarks is that throughout the whole discussion there has been no divergence from the subject of porcelain. No doubt you will agree with me, that in discussing papers generally, there is a tendency to diverge from the subject; but it seems as though everybody was so intensely interested in porcelain that all kept strictly to the subject. I perhaps am as enthusiastic and favor the use of porcelain quite as much as anyone present, but I still use gold, and still place my dependence on gold in many cases; with us I think it will be a long time before gold will be displaced as an agent for saving teeth in those cases where we can use it without making a blemish in the mouth.

I have thought Dr. Jenkins was a little severe on the gold filling in times gone by, but I have laid it only to his enthusiasm in regard to porcelain. I hope the time will come when we shall all be sufficiently proficient in porcelain to reach the high ideal he has set for us, and I think the tendency of the times shows that the American dentist will accomplish this.

Dr. A. H. Merritt. Like Dr. Tracy, I still do a great deal of work with gold in the posterior teeth, where its sightliness is not to be considered, and in my hands it has produced better results than I have been able to obtain with porcelain. Yet I feel that when I shall have acquired the ability which others have, I may find the satisfactory results which our essayist mentions.

Dr. S. L. Goldsmith. I feel great admiration for what Dr. Jenkins has said this evening. Porcelain has no doubt come to stay, but I think many men are a little over-enthusiastic, and it would seem wise for a few men to hold back just a little. I have nothing to say in detraction of some of the most beautiful work I ever saw; but I must also say that I have seen porcelain where it certainly ought not to be. I think Dr. Jenkins has done more for the porcelain art than any man of recent times.

Dr. Sanger. I would like to ask Dr. Jenkins to tell us about the very thin platinum-iridium he mentioned.

Dr. F. L. Fossume. I had the privilege of meeting Dr. Jenkins in St. Louis, and got many valuable points regarding the practical construction of inlays. He gave me half a dozen wheels, probably one-eighth of an inch in diameter, for cutting grooves in the inlays. They are better than anything I ever tried, and I thought possibly Dr. Jenkins would tell us where we might get them.

Dr. Perry's little glass points look very good to me. I use a set of ten burnishers made of ivory for burnishing the matrix. They work very congenially, especially with a refractory metal like platinum.

The new body Dr. Jenkins has mentioned, I had an opportunity of using for an inlay in a lower first molar, where it was necessary to have a very dark color and an opaque effect, which I cannot get

with the ordinary Jenkins body. The trouble is that the colors change greatly, especially the very dark ones in large contour fillings, when many bakings are necessary. The prosthetic body will also hold its shape while fusing, and this makes it much easier to reproduce cusps and contour.

Dr. Perry. I shall be glad if Dr. Jenkins will answer another question, namely, How important does he consider it to be to allow the inlay to cool off slowly in order to give greater strength? I am not aware of the practice among the manufacturers of artificial teeth. I do not know how long they leave their teeth in the muffles and allow them to cool off. I think it would be wise to let the porcelain cool more slowly than we do.

Dr. G. H. Leggett. The point has been mentioned about an inlay coming out. I might say that after getting the inlay in place, I take the remainder of the cement left on the slab and put it all over the tooth, and I think it tends to make a stronger joint.

Dr. Hatch. I would like to ask the essayist what he considers the best method of etching the porcelain—whether with hydrochloric acid or by cutting with a diamond, or both? I would like to know (if he would consider it proper to use the trade name in this assembly) the best cement for use with porcelain inlays. For after all is said and done, the *cement* is the filling material when we use porcelain. That is the material that comes in contact with the dentin and the cut ends of the tubules, and it seems to me very important that it should be considered.

I would also like to know if anyone has taken any accurate measurements, or made any scientific observation as to the effect that a stream of hot air has upon cement—whether it weakens it, or has any effect upon it other than the hastening of the setting.

Dr. Jenkins. In regard to the cement, that is certainly a matter of very great importance. Some investigators have believed that phosphate cements invariably possess certain nodules which do not become perfectly plastic. An interesting paper was read at St. Louis by Dr. Poundstone of Chicago upon this very subject. He claims to have discovered what I presume is probably true, that many cements have a period of expansion for some time after they are apparently crystallized. The whole subject is one of the very greatest importance, and is under investigation by a number of very experienced and able experimenters, and I hope the coming year at least will give to us a knowledge of the properties, qualities, and character of cement which will be valuable and instructive. The perfect cement does not as yet exist; but my own advice to every practitioner is that he shall in general use the cement to which he is already accustomed, rather than to "fly to other evils that he knows not of."

As for etching, my own feeling is—and I think it is the general consensus of opinion in Europe—that it is desirable to remove the glaze to a certain degree upon the under surface of a filling—not by hydrochloric acid, but by the light touch of a very small sandpaper disk—and afterward to undercut that inlay slightly in such places as are indicated where the strength of the inlay can in no way be impaired by such light undercuts. They are of very great value, and oftentimes it is desirable to have numerous such undercuts.

As to these beautiful glass points which have been offered to us tonight, I have had no practical experience with them, but I can understand that they may be extremely useful. The edges of a cavity for an inlay should be polished until they are radiantly smooth. It makes the fit of the inlay far more perfect.

The ivory points which Dr. Fossume invented also appear to have great usefulness. It is only a question—he can perhaps answer that—if they do not become a little rough in constant use, particularly when used against gold foil. I observe that he mentioned they were especially useful for a platinum matrix.

Dr. Fossume. Only because the platinum matrix is harder to get a perfect fit with than with the gold.

Dr. Jenkins. The question arose in my mind whether they would continue to be permanently useful in the case of a gold matrix. For a platinum matrix, I should say they would remain indestructible.

Dr. Fossume. I have used them entirely lately for both gold and platinum matrices.

Dr. Jenkins. As to the thickness of the platinum, that is always a matter of judgment. In the cap or band it may be made of great thinness, far below No. 30 gage. For plates, from No. 30 to No. 32 gage is most frequently employed in my office; but it is always a matter of judgment and discretion.

As to cooling off rapidly or slowly, that is also a matter of judgment. In an inlay it is a matter of no moment if in the first three bakings it is cooled off with great rapidity. At the last baking, however, it is desirable to cool it off more slowly. I had always believed and been taught to believe from the beginning, that one must exercise extreme care to prevent artificial teeth from cracking after one had exposed them to the heat of soldering, or to the heat necessary with porcelain prosthetic work. After having succeeded in obtaining—in the small quantities of laboratory experiment—what I have called prosthetic porcelain, it took me two years of constant labor to produce this material in a sufficient quantity for mercantile purposes. It was during that time that I had occasion to try innumerable experiments in attaching artificial teeth to platinum bases, under all sorts and conditions. I believe out of many hundreds of such experiments there were only two where the artificial teeth cracked, when removing the piece at a white heat out into the open air of the laboratory. That can be done with prosthetic porcelain perfectly well. It is so tough and elastic that it will not itself crack by this sudden change of temperature into the free air. If you throw cold water on it, it will of course crack. Artificial teeth under those circumstances crack with extreme frequency in the free air.

It shrinks? Of course it does. You cannot get solidity in any other way. Any porcelain powder which does not shrink does not become solid. But it cannot be driven. It is a feminine material.

If you pack it gently into its position and repack it, always under the same conditions, you will eventually get a perfectly solid and reliable body. It can be melted and re-melted a great number of times without in the least degree impairing its qualities. That is of value, especially if an accident should occur; then it is possible in a case of continuous gum work to repair it by repeated meltings without danger of injuring the original material.

Of course, everything relating to this class of work requires experience. It requires judgment, it requires self-control; but there is no such thing as a really scientific and skilful dentist who cannot, if he choose to give himself the trouble, produce better results with porcelain than he ever succeeded in getting with gold. About that there is no question in my mind; but I am very glad there exists such a degree of conservatism in the profession as to lead it to continue steadfast in the employment of the materials to which it is accustomed. If we were to attempt immediately to attain to the full efficiency of every important discovery, we should make a mess of it. It is better that we go slowly, and that we reach our goal through the process of natural evolution.

Many thanks, gentlemen, for the great kindness with which you have listened to me so patiently.

On motion a rising vote of thanks was given to Dr. Jenkins for his admirable address.

Adjournment.

B. C. Nash, *Secretary.*

THE DENTAL COSMOS

A MONTHLY RECORD OF DENTAL SCIENCE.

Devoted to the Interests of the Profession.

EDITED BY

EDWARD C. KIRK, D.D.S., Sc.D.

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PHILADELPHIA, JANUARY 1905.

EDITORIAL DEPARTMENT.

AN INVITATION FROM THE BRITISH DENTAL ASSOCIATION.

MEMBERS of the National Dental Association and of the dental profession of the United States will, we feel sure, receive with much satisfaction the intelligence here conveyed by the Hon. Secretary of the British Dental Association, the full text of whose letter is appended.

Various efforts have been made in times past to bring about a closer professional affiliation between the dental practitioners of England and America, and recently these efforts have failed of accomplishment, in each instance through some unlooked-for and apparently unpreventable occurrence. Unfortunately there have always been those who were too ready and even anxious to attribute these miscarriages of fraternal effort to selfish motives or personal reasons. But happily the fact remains that the real feeling of international confraternity between our English colleagues and ourselves is of more durable stuff than is indicated by such an analysis. Indeed, the very fact of the interest which each feels in the other and the persistency with which the effort to get into closer professional relations repeats itself is sufficient evidence of the genuineness and depth of the sentiment which prompts it. We have advocated the importance of developing these international relationships for the good results which they bring to dentis-

try. We feel that such a view needs no argument to support it; the proof of its correctness is furnished in the records of all the great international meetings of recent years: the science, the practice, and the professional relations of dentistry have been stimulated, improved, and strengthened thereby. The benefit has not been felt alone by those who have actively participated in the work of these international meetings, for the whole world's dentistry has in a measure received its share of the good thus attained.

But there is the individual or personal side of the question. No man can take part in such a meeting, where he comes into contact with the best thought of the representative men of his profession, without being broadened intellectually, socially, and professionally by the association. This is doubly the case when the contact is, for the time being, with men who are satisfactorily attaining the objective ends of dental practice by methods and by a system of training differing radically in many respects from his own. If the contemplation of these conditions teach him no other lesson, he must at least imbibe the truth that several roads lead to the dental Rome, and that therefore professional knowledge and achievement do not begin and end with himself. And that is the idea, the principle, which broadens—which lifts its possessor beyond provincial lines, enlarges his charity and sympathy, and makes him, in a professional sense at least, a citizen of the world.

The date of the Southport meeting will doubtless be a barrier to a large attendance upon the part of Americans, as very few will be able to desert their official posts at that season. Nevertheless it is to be hoped that a fair delegation may be able to attend and give practical expression to the gratification which we all must feel at this evidence of good will and professional hospitality upon the part of our British colleagues.

Following is the notification:

BRITISH DENTAL ASSOCIATION,
32 LEICESTER SQUARE, LONDON, W.C.,
November 28, 1904.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I have the honor to inform you that at a meeting of the Representative Board of this association held on October 29th, it was resolved —"That an invitation be extended to the National Dental Association of the United States, the Dental Association of the Dominion of Canada, and other British colonies, to attend the annual meeting of the British Dental Association to be held at Southport on Saturday, Monday, and Tuesday, May 20, 22, and 23, 1905."

I should be glad if you could insert the substance of this letter in the pages of your journal.

I am, sir, yours faithfully,

W. H. DOLAMORE, *Hon. Secretary*.

THE WAY IT LOOKS OVER HERE.

Our professional brethren in Australia are apparently passing through the initial stages of dental legislative parturition, and in some directions with clearly marked indications of dystocia. We learn from the *Commonwealth Dental Review* that of the six states comprising the Australian Commonwealth, none had a dental act previous to 1884, and that those of Western Australia, New South Wales, Queensland, and South Australia have been passed since 1900. While the whole body of Australian dental legislation is comprised in but six acts, strange to say Australia appears to be re-enacting the incongruity of inharmonious legislation and lack of interstate reciprocity which has for many years been as Sindbad's Old Man of the Sea to American dental reciprocity.

One would have supposed that in a new commonwealth, having before it the possibility of avoiding so ancient and palpable an error, the leaders of dental progress would have profited by the mistakes of others and built their dental legislation upon the broader basis of unity of standard with resulting interstate reciprocity. To have neglected the teachings which history and experience afford in so vital a matter is a calamity which will necessitate the rehearsing of the whole gamut of hardships and difficulties, the professional irritations and animosities which this older commonwealth of the United States is still contending with. Moreover, there is the so-called psychological moment in a matter of this character, when it is not only possible but easy to do the right thing. If unification of legislative standards is ever possible, it is when the legislative movement is initiated. If started wrong and upon a heterogeneous basis the correction of the error becomes increasingly difficult, because no amendment short of re-enacting the laws upon a basis of uniformity of standard will cure it. We can see no valid reason why, with only six statutes to unify, there should be any great difficulty, if the thinking men who are active in these matters grasp the principles involved and practically apply them to the legislative problem. That our Australian friends are struggling with this problem is evident, and we shall watch with interest the outcome of their efforts.

Dental legislation grows by evolution and is at any given period a reflex of the professional attitude of mind at that time; we have discussed and defended this fundamental proposition in these pages from time to time, and believe it to be correct. Applying the test of the principle in question to certain phases of Australian dental legislation—the Queensland Dental Act of 1902, for example—we are inclined to think that those responsible for the drawing and passage of that act are applying the high protective tariff principle to

dental education. We do not propose to broadly discuss the vexed problem of protective legislation, but we think it will be admitted even by the extreme advocate of protection that its application in any given instance is a relative question, and still further that education is not one of the industries or things which, considering the best interests of the community, should be included within a high-tariff schedule, or that the importation of knowledge should be checked or prohibited by restrictive legislation.

Sections IX and X of Art. 26 of the Queensland Dental Act empower the Dental Board to prescribe "what certificates, diplomas, licenses, letters testimonial, or other titles, status, or documents, will be recognized by the board as qualifying persons holding them, or any of them, to be registered as dentists." Such prescribed regulations by the board are subject to the approval of the Governor in Council.

Art. 26 of the by-laws, approved May 27, 1903, provides for the recognition among others of the "Degree of Doctor of Dental Surgery or of Dental Medicine conferred by a college or school which is a member of the National Association of Dental Faculties of the United States of America, duly conferred upon any resident of Queensland who after the first day of January 1900 and before the commencement of the act became a student at any such college or school."

The intent of the above-quoted regulation would appear to be the effort to provide for the interest of a limited number of individuals, residents of Queensland, who had already begun their course of study in American dental schools and to whom the act of 1902 would work a hardship if no special provision had been made to grant them the right to practice on the evidence of qualification furnished by their American diplomas after these had been earned. If we have correctly interpreted the meaning of the regulation, then it is distinctly special class legislation, and in no sense an official recognition of the qualification which the American degree represents. The special class character of the provision is further shown by the limitation of its application to the time of passage of the act of 1902, by which arrangement all Queensland students then in American dental colleges would be taken care of, but all who might desire to avail themselves of the same opportunity after 1902 would be prohibited.

The high protective principle back of this kind of legislation is still further brought out by the fact that the Queensland Dental Board no longer recognizes the qualification for dental practice furnished by the degree conferred by colleges of the National Association of Dental Faculties of the U. S. A., but does admit to registration in Queensland without further examination holders of the D.D.S. degree conferred by Trinity University, Toronto, Canada. It is well and generally known that the Trinity University degree of D.D.S. is a *sine curriculo*

degree granted solely upon the results of an examination. It is also well and generally known that the said degree is not accepted for registration nor recognized as a qualification for practice in Canada where it is conferred. The status of the D.D.S. degree of Trinity University was the subject of investigation by the National Association of Dental Faculties at its meeting this year in Washington, D. C., and the published proceedings of that body show that it was disapproved of because it did not represent a completed course of training equivalent to that upon which the same degree was conferred by colleges of the N. A. D. F., and further because it was a degree not adapted to nor intended for home consumption, but for export only.

It is fair to presume that the intent of all dental legislative enactments is to protect the citizens of a community from the disastrous results of incompetent dental service. Such being the case, it is rather difficult to understand how the citizens of Queensland are to be better served by holders of a degree which is granted upon examination *sine curriculo* than they would be by the holder of a degree that is evidence of a regular standard course of dental training. On the face of the matter it would seem as though the interest of the public was being sacrificed to the provincialism of the Dental Board.

But the question at issue has much broader bearings. The effort to restrict the tendency of certain ambitious and energetic Queensland citizens to secure for themselves what of value they may find in American dental education is in our judgment evidence of a short-sighted policy. We can well understand the patriotic sentiment which would put forth every effort to conserve and develop dental education as a home industry. But does a restriction or prohibition of foreign dental training for Queensland students, in the infant stage of the home educational interest, tend toward its conservation or development? We think not. On the contrary, if Australia is to have the best dental schools—and we presume she so desires—she is more likely to accomplish that object by importing the best culture and thought which the dental educational systems of all countries are able to afford. To exclude it, or even to inhibit the influx of such training when imported in the persons of her own citizens, is a narrow, not to say suicidal, educational policy. When contrasted with the liberal and far-sighted international educational plan of the late Cecil Rhodes we think it suffers somewhat by comparison.

Education is not a proper subject for protective legislation in the sense that its sources may be legislated out of reach, nor that any should be by law deprived of its benefits. The opportunity to obtain knowledge should be open to all who have the ability and means to acquire it. Therefore we believe that the wiser policy of our Australian friends in building up their own dental educational system would be to import the best that the world affords, by sending out those capable of bringing back to them the principles and methods

which have already proved to be successful. It is upon such a basis that a successful educational system can be built without repeating the mistakes and errors which in the process of evolution have to be passed through before success is ever attained. This, it seems to us, is the way of wisdom based upon experience, and clearly transcends in value the natural process of educational evolution.

A PACIFIC COAST DENTAL CONGRESS.

We have been asked to announce the holding of a Dental Congress at Portland, Oregon, about the middle of July 1905, and in making this matter known to the dental profession at large we feel that we cannot do so better than by publishing the following letter from the secretary of the temporary committee of organization. This effort of our friends upon the Pacific Coast should receive cordial support from the Eastern section. The East has, we regret to say, not shown the same tendency to assist the efforts of our Western colleagues in movements of this kind as our Western colleagues have so frequently and earnestly done for movements which have originated in the Eastern tier of states. The Portland Congress will offer a favorable opportunity to bring the two great sections of our country into closer contact under the most favorable conditions, and this preliminary notice is one which should receive the thoughtful consideration of those of us who are interested in the professional advancement of dentistry in America:

Portland, Oregon, October 18, 1904.

To the Editor of the Dental Cosmos:

Sir,—Will you announce through the Dental Cosmos the proposed Dental Congress to be held in this city next year at about the time of the meeting of the American Medical Association, which holds its annual meeting here July 11 to 14, 1905. We expect the active participation of many dentists in the states west of the Rocky Mountains, and in order to increase the interest of the meeting are particularly anxious to secure the support and attendance of prominent Eastern men.

Instead of the usual European vacation, we can give them a vacation trip of intense interest. Railroad rates to Portland next year will be exceedingly low on account of the Lewis and Clark Fair, and, by proper routing, Yellowstone Park, Puget Sound, and Southeastern Alaska may be visited on the north, and Yosemite Valley and San Francisco on the south, and the Columbia river from Portland.

If you will have this notice published in the Cosmos, the preliminary committee for the Congress will feel under very great obligations to you.

Yours very truly,

Arthur W. Chance, D.D.S., M.D.,
Sec'y Temporary Committee.

REVIEW OF CURRENT DENTAL LITERATURE.

[*Deutsche Monatsschrift für Zahnheilkunde*, Berlin, November 1904.]

POST-EXTRACTION PAIN. By Dr. Luniatschek.

The author remarks in the opening paragraph of his paper that the majority of contributors to the literature of the subject have discussed this post-operative manifestation mainly from a therapeutic viewpoint, disregarding almost entirely the etiological factors involved. He quotes from the writings of Bruch (1856), and of Nessel, who attributed the pain to a rigorous contraction of the gingiva against the rough and sharp edges of the alveolus. This author also referred to the possibility of pain arising from irritation to the exposed nerve filaments from the trunk supplying the extracted tooth, and from periosteal inflammation. Hollaender attributes the pain to spiculæ of bone within the alveolus and gum tissue. If the pain be due to an exposed nerve at the bottom of the alveolus, Hollaender advocates the irrigation of the alveolus with a carbolic acid solution (1:100) and the subsequent application of a cotton tampon previously made to take up a small quantity of a mixture of carbolic acid gr. xxx, liq. potass. carbonat. gr. xxx, distilled water ℥j. Baume does not believe that the pain is attributable to the tearing apart of the nerve supplying the pulp, as it occurs in the extraction of pulpless teeth, and accepts Bruch's theory as above described. The therapeutic agencies he recommends are hot infusion of camomile flowers and analgesics. Scheff shares with Saviers the opinion that the pain is brought about by the tearing and laceration of the pulp and periosteal nerves and stretching of the alveolar walls. Scheff considers post-extraction pain to be due in some cases to nerve filaments becoming caught in fissures in the alveoli fractured during extraction. To these cases he has given the designation of "alveolar neuritis." The author also refers to the writings of Preiswerk, Isaacson, Sewill, Pedley, Hattyasy, and Scheuer. The last-named states that in two separate cases he found the pain to be due to a neuroma in the fundus of the alveolus.

In this connection Dr. Luniatschek remarks that during his thirteen years' experience at the dental institute of the Royal University of Breslau he did not observe a single case of neuroma, but he adds that in the case of the lower teeth, owing to their close proximity to the inferior dental nerve, such occurrences are within the range of possibility.

Gobbi has classified the causes responsible for the production of post-extraction pain under two headings, namely, diseases and external phenomena. Under the first heading he has grouped apical abscess, diffuse acute pericementitis, circumscribed periostitis alveolaris, diffuse chronic pericementitis, and marginal necrosis; occasionally senile alveolar atrophy, pyorrhea alveolaris, dental neuroma, and septic inter-alveolar necrosis. Under the second heading the following phenomena are described: growth and hypertrophy of the neighboring gum tissue over the alveolar lamellæ; inflammation of the alveolar lamellæ; hypertrophy of the alveolar septa, and excessive stretching apart of the alveolar walls.

To recapitulate: Post-extraction pain, according to the authors already named, may be due to any of the following conditions: Sharp alveolar edges and cicatricial accumulations; premature removal of the clot and retraction of the gingivæ; neuromata; alveolar neuritis; stretching of the nerves supplying the pulp and the pericementum; bruising of the pericementum; formation of sequestra; inflammatory diseases of the jaw and pericementum in existence previous to the extraction. In this group the author endeavors to classify a phenomenon heretofore unobserved as having a bearing upon the causation of post-extraction pain, namely, inflammation of the salivary glands of the floor of the mouth, caused by diseased conditions of the teeth and spreading to the submaxillary nerve ganglion, which is directly connected with the lingual nerve and with the facial, through a branch from the chorda tympani. It is therefore evident that if the disease which has rendered necessary the extraction of a tooth has involved the glandular structures in the floor of the mouth and the submaxillary ganglion in the immediate neighborhood, the pain due to the inflamed condition of these nerve struc-

tures will persist in some cases even after the removal of the offending organ.

Dr. Luniatschek has collected sixty-three cases of post-extraction pain during his thirteen years of service at the University of Breslau. During that period extractions were performed at the rate of about two thousand per year, and therefore the recorded number of sixty-three cases of post-operative pain may be considered relatively small—a fact probably accounted for by the prophylactic methods in vogue at that clinic. After the extraction the patient is directed to rinse his mouth with cool water to stimulate the flow of blood in order to obtain a firm clot. The edges of the wound are brought together as closely as possible and the surface is covered with a cotton tampon to protect the clot. A mouth-wash is then prescribed of spirits of thymol 0.5: 100, to be used properly diluted with water.

[*Bulletin de l'Association générale des Dentistes de Belgique*, Brussels, June 1904.]

CALCULUS IN STENSEN'S DUCT. By Dr. Bon.

All salivary glands may become the seat of phosphatic deposits, but the duct of the parotid gland and the parenchyma of the gland itself are less frequently thus affected. Statistics arranged and collected by Clasmadenc show that deposits in any of the structures of the parotid are ten times less frequent than in any other glandular tissue. Du Parc believes that the movements of the mandible facilitate the outflow of parotid saliva. Brien is inclined to consider the chemical composition of the salivary fluid accountable for the formation of such deposits. Salivary calculi are composed almost exclusively of calcium and magnesium phosphates. Submaxillary saliva contains only small quantities of these salts—a fact which stands out in opposition to Brien's theory, for as above stated, phosphatic concretions are relatively rare in the parotid, although the saliva from this gland is richer in those salts. Galippe formulated the infectious theory, believing that accumulated microbes form the nucleus of the calculus. Immisck's hypothesis is the one unreservedly accepted at the present time. According to him, the initial step in this type of calculus formation is an inflammatory condition of the duct, which may arise by continuity from a similar disease condition of the lining membrane of the mouth. The inflammation produces rugosities at certain points in the duct. The inorganic constituents of the saliva become retained in these crevices, and occasionally form the nuclei of larger deposits.

The author then reports the following illustrative case: He was consulted by a man aged forty-five regarding a painful swelling upon the left cheek. He had suffered from the same disturbance upon several different occasions. Some twenty years before he had begun to experience an uneasiness on the same side of the face. The movements of the mandible became difficult. At times during mastication he would experience such violent pain that he would be forced to give up his meal. Shortly after such occurrences the tissues would swell. Slight massaging of the cheek would cause the swelling and pain to disappear. These painful crises would occur at frequent intervals. The parotid duct was explored several times and found free from deposits. The upper left third molar was extracted. This produced some relief. About fifteen years ago he again suffered from violent pain in the cheek, which affected the ear of the corresponding side. The examination conducted by Dr. Bon revealed an inflammatory condition of the duct, from which a purulent liquid was escaping. The sounding of the canal produced first the exudation of a purulent liquid, and then of a transparent viscid one. A subsequent sounding resulted in locating the calculus, which was found lodged in a pocket a short distance from the duct. Eventually, and after considerable suffering and inconvenience, the calculus was expelled. Complete recovery soon followed.

[*Tribune Médicale*, September 10, 1904.]

STOVAIN: ITS ADVANTAGES, DISADVANTAGES, AND INCOMPATIBILITY WITH ADRENALIN. By Dr. Forsy.

Stovain has over cocain two indisputable advantages: its toxicity is less than that of cocain, and its action upon inflamed tissue is decidedly beneficial. The fatal dose of stovain when injected into guinea-pigs is from fifteen to twenty centigrams; that of cocain is five centigrams. The proportionate toxicity of stovain to cocain is as 1: 18.

The disadvantages of stovain are—first, the degree of anesthesia it induces is slightly less that that brought about with cocain, and is also of shorter duration; second, stovain is a pronounced vaso-dilator, and therefore the afflux of blood in the course of an operation is likely to interfere with what otherwise might have been a comparatively easy intervention. Some operators consider this vaso-dilator action decidedly advantageous, as thereby it may be possible to operate

with the patient in the sitting position, there being no danger whatever of bringing about an anemia of the medulla with its consequent dangerous effects. But thus far it has not been shown that cocain syncope is due to bulbar anemia. The extreme vaso-dilator action of stovain cannot be modified by the addition of adrenalin, as the two agents are utterly incompatible. A stovain-adrenalin mixture produces in the guinea-pig the following three principal effects: first, marked vaso-constriction; second, diminution of the toxicity of stovain; third, it produces gangrene at the point of injection—a fact sufficiently potent to preclude its employment about the mouth.

The cocain-adrenalin mixture offers, on the other hand, all the advantages and none of the disadvantages of stovain, namely, perfect anesthesia in inflamed and non-inflamed tissues, weak toxicity, arterial hypertension and tonic action upon the heart, and local vaso-constriction. The author advocates the use of the following solution: 10 to 20 cc. of cocain solution 1:200, and 10 drops of adrenalin 1:1000.

[*Russki Vratch*, No. 3, 1903.]

SECRETORY REFLEXES OF THE ORAL MUCOUS MEMBRANE. By J. M. Heyman.

The author has endeavored to determine the areas of the oral mucous membrane which are particularly susceptible to certain classes of irritation. He has found that the tongue is decidedly responsive to chemical irritation, especially the base, sides, and lower surface. Bitter and sweet substances act only upon the base of the organ. The secretion of the parotid is stimulated by intensely sapid substances. The effect of thermal irritation is more pronounced upon the lower lip and the base of the tongue, which are responsive to 55° C. Next in the order of responsiveness to this type of stimulation come the upper lip and the tip of the tongue—to temperatures of 60° C.; and lastly the cheeks—to temperatures of 65° C. The infliction of pain on the mucous membrane of the mouth stimulates salivary secretion, except when the pain is located upon the cheeks. Mechanical irritation induces salivary secretion when directed against the palate and the base and dorsum of the tongue. These different impulses travel through the lingual and glosso-pharyngeal nerves. Investigations have shown that the lingual nerve transmits impulses arising not only at the tip, but also at the base of the organ.

[*Dominion Dental Journal*, Toronto, November 1904.]

ETIOLOGY, SYMPTOMATOLOGY, DIAGNOSIS, AND TREATMENT OF EMPYEMA OF THE MAXILLARY ANTRUM. By R. E. Loucks.

The causes of antral empyema may be divided into predisposing and exciting. The principal predisposing factor is temporary or permanent closure of the ostium. Swelling or thickening of the mucous membrane, the formation of granulations, polypi, or even the presence of inspissated mucus may be the cause of obstruction. Under the exciting causes are included the infectious diseases (particularly influenza), infection from other sinuses, as from the posterior ethmoidal and sphenoidal cells. Maxillary sinusitis due to alveolar abscess infection is the variety that comes most frequently under the observation of the dentist.

Regarding symptomatology, if the condition be due to inflammation of the muco-periosteum or to polypi, the patient usually complains of a blocking of that side of the nose, with a constant or intermittent discharge of fetid pus. Not infrequently attention is first attracted by a sense of fulness, pain in the back of the orbit, with a severe unilateral headache; neuralgia, with soreness of the teeth on affected side, especially if the ostium be closed and the cavity be full of pus; pain on pressure over the infra-orbital nerve and the region of the antrum, and there may be a bulging of the nasal, orbital, or facial walls. The neuralgic pain is described as a boring, nibbling, or bursting one, which is intensified by stooping. The discharge is unilateral, and liable to occur on rising, on stooping, or lying with the head on the sound side. There may be a perversion of taste, and the patient is aware of the fetidity of the discharge. The pus may trickle down the throat on lying down at night, and produce violent attacks of coughing, or in escaping into the pharynx may set up a catarrh of the Eustachian tube or an acute pharyngitis. Diagnosis: Bright yellow pus escaping from one nasal cavity would indicate the existence of suppurative disease of one of the accessory sinuses. Examine the nasal cavity after the application of a cocain solution to contract the tissues. A drop of pus on the surface of the middle turbinate, edematous granulations or polypi around the margin of the hiatus, dulness or sensitiveness of the suspected side, the presence of diseased teeth, the presence of a shadow on the suspected side, detectable through transillumination, exploratory

puncture with a large hypodermic needle or trocar passed through the wall of the inferior meatus or through the sockets of diseased roots after extraction, irrigation through the natural opening by means of a curved cannula, using a solution of hydrogen dioxid.

The use of hydrogen dioxid as directed by Dr. Loucks is a procedure which may result in a great deal of discomfort to the patient, and in the infliction of temporary and even permanent injury. It may be interesting here to quote the opinion of the reviewer on this point as published in the DENTAL COSMOS, issue for July 1904, page 586, as follows: "It is necessary to raise a word of warning on the use of hydrogen dioxid in the treatment of infected cavities, and in all places in which there is a likelihood of the infectious matter being forced beyond the original limits of the inflamed area. In the care of antral empyema the injection of hydrogen dioxid might result in the pyogenic exudate being forced into the frontal sinus, giving rise to a suppurative inflammation of those cells and possibly to cerebral meningitis. If a sufficent quantity of H_2O_2 be injected, the pressure caused by the liberation of oxygen, besides causing disorders of a trophic nature, would force some of the infected material into the frontal sinus by way of the hiatus semilunaris and its continuation, the infundibulum."

Regarding treatment, the author states that the essential feature consists in establishing proper drainage, thorough cleansing, and disinfection. If the cause lie in a diseased tooth, remove it at once, but if all the teeth be sound, secure an opening through the canine fossa to irrigate and clean out the sinus. It is recommended that a counter opening be made through the inferior meatus, particularly in chronic cases of long standing.

[*Zubovratch Vestnik*, February 1904.]

INFLUENCE OF HIGH TEMPERATURE AND OF PUTREFACTION UPON NATURAL AND ARTIFICIAL TEETH. By Drs. Von Lepkowski and Wachholz.

The authors (*Wien. Zahnarztl. Monatsschr.*) have studied the effects of high temperatures upon the structure of natural teeth. The teeth were inclosed in porcelain capsules and were then subjected to high temperatures. Upon withdrawal it was found that the dentin was carbonized, and it reflected rays such as those arising from an anthracite block. The enamel eventually becomes of a brownish tint, preserving, however, its color and gloss longer than does the dentin. When natural teeth are placed in direct contact with the flame the enamel is the first tissue to crumble down. The continued effect of heat renders the tooth of a grayish color, gradually evoluting to white, and in the meanwhile becoming so friable as to crumble to pieces at the slightest application of force.

Gold and platinum appliances remained unchanged, even when the heat was of such an intensity as to totally carbonize the skull.

The subjection of appliances of gutta-percha and nickel to these temperatures resulted in the combustion of the former material to the extent of not leaving the slightest trace; the metal became very brittle. The artificial teeth in the carbonized skulls were in good condition. Amalgam and gutta-percha disappeared entirely. Cement fillings did not suffer alterations of form, but became harder and whiter. Amalgam-cement fillings lost the amalgam ingredient, the cement undergoing the changes just mentioned. Porcelain inlays remain intact.

Natural teeth subjected to the influence of putrefaction showed after from four to eight months, that the enamel was throughout its thickness of a greenish hue.

Fillings of gold-amalgam advocated by Witzel had a copper aspect after four months. The copper amalgam fillings advocated by Lippold became very rough and covered with verdigris. Cement and nickel darkened, fillings of temporary stopping became softer, and had upon their surfaces growths of different varieties of fungi.

[*British Dental Journal*, London, November 1904.]

BRIEF NOTE ON PYORRHEA ALVEOLARIS IN INDIA. By Major Andrew Buchanan.

The writer has observed a considerable number of cases of pyorrhea alveolaris in India. In a population of about one thousand there were two hundred cases. The disease was most prevalent in those districts in which the famine had been most severe. In a batch of ninety prisoners who had come from one of the districts most affected by the famine, over seventy were suffering from pyorrhea. The pyorrhea was cured, and in six weeks they gained in weight an average of eight pounds per man. The great improvement in these men was partly due to the curing of the pyorrhea.

Incidently Major Buchanan alludes to the relation of gingivitis (spongy gums) to scurvy, stating that while spongy gum is in some cases a manifestation of scurvy, it may like-

wise be due to other forms of malnutrition, to mercurialism, to want of attention to cleaning the teeth, and to pyorrhea alveolaris. The majority of cases of inflammation of the gums he observed were the result of mere carelessness as to hygiene of the mouth. These cases are almost all easily curable by local medication, a fact which serves to differentiate them from the cases of spongy gums resulting from scurvy. In the prisons of India it has been found advisable to examine the gums of all prisoners on admission, and to treat them should they require it. The prisoners are made to take daily care of their teeth, so that if scurvy should develop it may be readily detected, as the first signs are those which are seen on the gums.

[*Lancet*, London, December 17, 1904.]

ETHYL CHLORID AS AN ANESTHETIC IN GENERAL PRACTICE. By Harvey Hilliard.

The author has administered ethyl chlorid to every variety of case and in every variety of way, alone and with air, with nitrous oxid, with chloroform, with ether and with A. C. E. mixture, and also as a preliminary to each of the last three for a large variety of surgical operations.

From the viewpoint of the general practitioner an anesthetic agent should be portable, of stable composition, safe, easy of administration, not requiring elaborate preparation beforehand, rapidly acting, and providing if necessary a narcosis of several minutes after removal of inhaler; a narcosis which shall be quiet and sleep-like, and which shall not necessitate close watching after a safe dose has been administered; an agent giving an anesthesia which shall not be followed by dangerous or unpleasant after-effects.

Ethyl chlorid in the opinion of the author fulfills most of these conditions. One full dose of ethyl chlorid provides an available anesthesia of at least two minutes—an anesthesia which, if complete muscular relaxation be not required, is, he thinks, ideal, and one after which unpleasant occurrences are not common if proper precautions be taken. But if, on the other hand, complete muscular relaxation be required the anesthetic must be pushed to the limit of safety, and although one gets a longer anesthesia, bad effects are more likely to follow. Ethyl chlorid is unsuitable for long operations, because not only does it produce anesthesia rapidly, but it is also very rapidly eliminated; consequently it is very difficult to maintain an even degree of anesthesia. If used for long operations the cost would be considerable and it would require the undivided attention of a skilled and expert administrator. It must also be added that after large doses faintness or more serious cardiac depression are likely to be met with.

Regarding administration, the author discusses the inhaler, the preparation of the patient, the posture, and the after-effects. Even for minor operations a certain degree of preparation is necessary, for if at the time of the operation the stomach, bladder, or bowels be full, they will empty themselves reflexly during or immediately after the administration. Almost any posture is safe, so far as the anesthetic is concerned, but children are best anesthetized in the recumbent position, for they are apt to collapse into a heap in the chair if the administration be conducted therein.

Concerning the dose, it is stated that an average dose for an adult is 5 cc., but of course it will vary according to the idiosyncrasies of the patient. Smokers and alcoholics will require more; anemic and weak persons much less.

The author concludes the paper by discussing in detail the after-effects and the clinical signs of complete anesthesia, which are as follows:

"Provided that the administration is conducted so that no outside air is admitted to the inhaler the following signs are observed: 1. Breathing deepens and becomes more rapid —this alteration in the character of the breathing affords a most valuable guide as to the degree of anesthesia attained, and results not so much from the action of the ethyl chlorid *per se* as to the restriction of oxygen, the oxygen originally in the inhaler being soon used up, with consequent stimulation of the respiratory center. 2. A little later one feels by the finger under the patient's chin some vibratory movements of the larynx, and a moment later still these vibrations become more and more audible, until (3) the characteristic laryngeal stertor is observed. At this point the administration should be stopped—*i.e.*, if the stertor be true tracheal stertor and not due to faulty posture causing obstructive or *false* stertor. 4. About the same time that the breathing deepens the patient's color improves and the face becomes suffused and he looks a pretty, healthy, pink color. The peripheral vaso-dilatation which causes the suffusion of the face also causes perspiration in many cases, and in others, again, considerable bleeding from the wound, especially after the removal of adenoids and ton-

sils, particularly if the anesthesia has been pushed and the vaso-motor paralysis thus increased. It has been established that ethyl chlorid kills, not by paralyzing the heart, but by paralyzing the respiration, the chest becoming fixed in over-expansion; thus, in restoring a patient who has been over-dosed, amyl nitrite would be useless. 5. About the same time, or a little earlier than that at which the first tracheal stertor has been noticed and a little later than that at which the face becomes suffused—usually from 40 to 50 seconds—the globes of the eyes become fixed, often after some preliminary nystagmus and usually in the position of convergent squint downwards. 6. A moment or two later the pupils dilate and if the anesthetic be not now removed the light and the corneal reflexes disappear, the pupils becoming very dilated and fixed. If air be now admitted and the anesthesia be lightened or continued in a lighter stage the pupils again contract, but in certain cases, even after the corneal reflex returned, the pupil remained wide and insensitive. To repeat, although in about 90 per cent. of cases the signs of deep anesthesia are stertor, fixity of the globes, and dilated pupils with loss of ocular reflexes, yet these signs must not be taken as invariable and one must always be on the watch for unusual symptoms. As a rule there is but little salivation during induction, but often one meets with profuse secretion of saliva for no obvious reason—this is a point worth remembering in arranging the patient's position. It is never wise to push the anesthetic in the case of fat subjects; they bear deprivation of oxygen badly and are more likely to suffer from shock; also their respiratory passages are as encroached upon by fat overgrowth on the inside as are the skin and cutaneous tissues, and the air-ways are more likely to become occluded. Never administer ethyl chlorid without first placing a wooden prop between the teeth—this not only keeps the air-way free, but is also a safeguard in case one may have to insert a Mason's gag to expedite means of resuscitation."

[*Items of Interest*, New York, December 1904.]

SEPTIC BLOOD IN PYORRHEA ALVEOLARIS. By Robert L. Watkins, M.D., New York, N. Y.

The author has observed that in advanced stages of pyorrhea there is the same appearance in the blood—in a less degree—as that which he has observed in puerperal fever and advanced carcinoma—a septic blood condition. This also occurs in certain forms of tuberculosis when there is pus formation; in chronic meningitis, scrofula, pyemia, epithelioma, severe phlegmon, gangrene, septic osteomyelitis, septic polyarthritis, ulcerative endocarditis, phlegmonous erysipelas, advanced cases of phthisis, alcoholism, or any condition in which pus may find its way into the circulation.

PERISCOPE.

To Protect and Remove Rust from Steel Instruments.—(1) Dissolve one part of paraffin oil in 200 parts of benzine. Wash the instruments and dry by warming. Dip in the solution and lay away in a warm place to dry. (2) Instruments of polished steel, iron, nickel, etc., will remain indefinitely free from rust or corrosion if kept in a 2 per cent. solution of either the carbonate, bicarbonate, benzoate, or borate of sodium.—*Medical World.*

To Clean a Handpiece Quickly.—Take a common glass tube, such as gold cylinders are contained in, and fit a good cork tightly into it. Keep a sufficient quantity of kerosene oil in the tube to cover the handpiece when placed in it. When the handpiece becomes sticky and the bearings rusted, plunge it into the tube of oil and run the engine rapidly for a short time. A second bath will rarely be necessary to cleanse the bearings in preparation for a little suitable oil.—H. Darling, *Dental Review.*

Disadvantages of Pulp-Removal under Cocain.—In using cocain there is a possibility that we may so thoroughly anesthetize the apical area that we shall lose our sense guide when removing the pulp with the broach. It would be an easy matter for us to protrude the broach in some teeth into the apical region and do much injury—especially

should the broach become infected and be the means of carrying the infection into this area. A troublesome alveolar abscess would surely follow. It will be wise for us, when using this or any similar obtundent, to avoid the probability of carrying infection from the canal to the apical region.—F. W. Joslin, *Dental Register.*

Hemophilia.—Grant reports the case of a hemophiliac, a boy, suffering from hemorrhage from a cut on the foot, in which the bleeding was checked apparently only by the use of ovarian extract, adrenalin and other hemostatics having proved useless. The treatment was based on the fact that women are rarely hemophiliac, and it is suggested that this female immunity is due to some constitutional influence emanating from the female reproductive center, an internal ovarian secretion. In the case here reported two and a half grains of ovarian extract obtained from sheep were given thrice daily.—*New York Med. Journ.*

Spraying the Dental Office with Aromatic Solutions.—Not infrequently our operating rooms have peculiar "dental odors" about them. Iodoform, carbolic acid, oils of cassia, cloves, and other essential oils and highly volatile substances, add in the mind of many sensitive patients still more repugnance to the office than they already feel from fear. It is my habit to spray the room with a weak solution of spirits of lavender—fumigate, so to speak, the entire breadth and length of the operating room. Compressed air does this admirably, and the room smells sweet and fresh and the air is far more agreeable.—Geo. Zederbaum, *Dental Era.*

Ancient Medical Advice.—The following advice, which is being printed in various lay newspapers, is said to have been given by Rhazes, an Arabian physician, to his patients more than one thousand years ago: "Study carefully the antecedents of the man to whose care you propose to confide all you hold most dear in the world—that is, your life and the lives of your wife and children. If the man be dissipated, given to frivolous pleasures, cultivates with too much zeal the arts foreign to his profession, and still more if he be addicted to wine and debauchery, refrain from committing into such hands lives so precious."—*Journ. Amer. Med. Association.*

Medical Training for the Dentist.—As dentistry is a specialty of medicine, it behooves us to know something of medicine in general; for a specialist of orthodontia or any other specialist of dentistry would be expected to know something, at least, of the general practice of dentistry. Thus the intelligent dentist should have some idea of the different diseases that affect suffering humanity, in order to converse intelligently with his patients in reference to any ailment or to discover any disease that may be causing them trouble and annoyance. It is not necessary that he should know all in reference to the case, its diagnosis and prognosis, but he should at least possess enough knowledge to advise his patient when to seek the services of a physician.—E. H. Shannon, *Dental Summary.*

Investment Compound for Crown and Bridge Work.—An investment compound that is second to none for crown and bridge work and all soldering purposes is composed of plaster and ashes. The ashes may be prepared for use by sifting common coal ashes until all grit is removed and a soft, flaky powder left. The powdered ashes are added to the plaster at the time of mixing, the proportion being about two of plaster to one of ashes. This compound sets very hard, and apparently does not contract or expand, nor does it burn out, warp, or crack under the heat of the blowpipe. This compound has proved to be far superior to all mixtures containing marble-dust, asbestos, sand, etc., and to many of the specially prepared ones that are on the market.—Frederick C. Brush, *Dental Brief.*

The Prophylactic Scope of Dental Surgery.—The serious loss of life as the result of preventable infection is appalling, and affords a striking example of the possibilities of research when aggressively undertaken. While we are largely unable to measure fully the potency and effects of infection, serious evidences of its ravages are often demonstrated to us. We are only too conscious of the seriousness of the pathological conditions arising from it, and while the practice of dentistry is confined within very narrow limits as compared with that of general surgery and medicine, it is none the less necessary that we should extend our knowledge and acquaintance of it, if we are to successfully cope with human suffering and the conditions that daily present themselves to us for treatment.—A. Cocker, *Dental Record.*

Treatment of Sensitive Dentin in Shallow Cavities.—Some classes of cavities are very difficult to obtund with chemicals. Shallow or three-walled cavities are difficult, be-

cause you cannot produce absorption by pressure. The dentin does not ordinarily absorb, it only transfers. To make the medicines penetrate they must be forced inward by cataphoresis, pressure, or heat, and to apply these measures is usually difficult in the cavities where we most desire to obtain an obtundent effect. I have had good results from applying a few crystals of menthol to shallow cavities, and dissolving this in the cavity with a drop or two of absolute alcohol, and then throwing a steady but small stream of compressed air into the cavity until it is dry. I do not know whether the menthol acts chemically by absorption, or whether the action is to be regarded as the physical effect of evaporating these volatile drugs, so producing an excessive evaporation of the tooth-moisture.—Geo. Zederbaum, *Dental Register.*

Birth of the Elements.—It is an old question, "Are the seventy odd chemical elements really elementary, or are they compounded of something still more elementary"? In the light of the recent discoveries concerning radium Prof. F. W. Clark recurs to a theory, advocated by him many years ago, that as the planets were evolved out of the original nebula which gave birth to the solar system, the chemical elements were also evolved out of something far less complex than themselves. The fact that existing nebulæ are very simple in composition, while stars in various stages of evolution exhibit more and more complexity, until, in solidified bodies like the earth, a great number of chemical elements with a myriad of compounds are found, is regarded as strongly supporting this theory. The phenomena of radium lead to the additional suggestion that, as in the development of the heavenly bodies we seem to see the growth of the elements, so in radio-activity we witness their decay.—*Carolina Med. Journal.*

Oxygen in Surgical Infections.—Dr. Thiriar recently communicated to the Belgian Académie de Médecine his further successful experience with the direct application of a stream of oxygen to infected tissues. He uses it in the form of a permanent application—a tube is inserted in the lesion, communicating with the oxygen tank, and left undisturbed for several days. Every case of infection of a serous membrane has been benefited by this treatment in his experience, but the results have been most striking in gaseous septicemia. The oxygen not only stimulates the tissues and promotes phagocytosis, but also kills the germs, substituting an oxygenated emphysema for the microbian emphysema. Oxygen applied under pressure to a furuncle or carbuncle has always aborted or cured it in a few days, and it has proved its usefulness in hundreds of cases of diffuse phlegmons, gangrenous erysipelas, suppurating complicated fractures, and arthritis. He does not advocate it for generalized infections, although recent publications have proclaimed the feasibility of intravenous injections of oxygen, with which Thiriar has had no experience.—*Journ. Amer. Med. Association.*

Local Medication in Pyorrhea Alveolaris.—After a thorough removal of all deposits the pockets are washed out with hydrogen dioxid, then with warm water. This is followed by injecting a drop or two of pure lactic acid to which has been added four drops of formalin to the ounce. As the acid application is somewhat painful, being escharotic to the soft parts, the shallow pockets are swabbed out with a little cotton wrapped on the point of a broken broach, thus keeping all excess of acid from any contact with the mucous membrane. Before applying the acid, however, the lips—indeed, a considerable area about the mouth—are smeared with a little zinc oleostearate to prevent the acid from burning, for, should the lips come in contact with the acid, it is almost sure to result in what the patient calls a "fever blister" or "cold sore." When the syringe is used, rolls of bibulous paper should be so placed about the pockets as to absorb the surplus acid. To counteract the effect of the acid on the mucous membrane, nothing is more effective than to rinse the mouth with milk of magnesia.—Gordon White, *Items of Interest.*

Chinese Medicines.—Though the pill habit is said by medical journals to cause more dyspepsia than it cures, it has at any rate the sanction of antiquity. In an article which Dr. H. L. Norris, a British naval surgeon on the China station, contributes to one of the medical journals, he remarks that doses in the Chinese pharmacopeia are invariably large, and that pills are taken "by the hundreds." The Chinese, he adds, possess an enormous veneration for antiquity, and beside powdered deer-horns to promote longevity, and tigers' bones to promote bravery, dose themselves with fossil ivory, fossil crabs and shell, ancient soot, and water in which a few copper coins of an early dynasty have been boiled. Other imaginative remedies are scorpions, dried silkworms, baked toads, wasps' nests, and cockroaches. At the end of a con-

siderable catalog of similar prophylactics, Dr. Norris observes that though his list is far from complete it will show through what a varied range of thought Chinese ideas have moved in attempts to relieve the diseases common to humanity. Perhaps the most curious of all preventive medicines is a soup made from a black cat, which is drunk by blacksmiths in Canton to prevent burns from hot metals. If the remedies are in themselves nauseating, the nomenclature of the drugs is almost literary. "The arrow of the hundred medicines," "thunder-pills," "water-dragon bones," "the king of the field boundaries," "thousand taels' worth seed," are some of the names.—*Amer. Medicine.*

Scurvy.—Manuiloff (*Russki Vratch*, September 4, 1904) describes the epidemic of scurvy which appeared in 1902 in the province of Viatka as a result of the famine in that portion of Russia. The struggle against scurvy was thoroughly organized by the authorities, and a special staff of physicians was detailed for this purpose. The epidemic began in January with eight cases, and increased until it reached 5836 cases in May, when it began to give way under the efforts of the sanitary authorities, finally disappearing in August. In addition to lack of food, the cause of the epidemic was the severe cold and the crowding of the peasants in their huts, in which domestic animals were also kept. Women suffered more frequently than men, and the disease occurred at all ages from sixteen to seventy years; only in rare cases did it affect children under ten years of age. The treatment consisted in improving the nutrition of the patient, and in the use of preparations of iron, quinin, and arsenic. In cases of loss of cardiac tone it was necessary to employ stimulants. The chief articles of diet were milk, vegetables (especially potatoes), beer, wine, lemons, citric acid, and cranberry juice. Massage and warm baths gave good results, but were used to a limited extent on account of the lack of facilities. Fresh air and sunlight were very beneficial. The gums were treated by the use of washes with boric acid, potassium chlorate, by painting with iodin, etc. In the presence of extensive hemorrhage in the feet, warm foot-baths and warm compresses with vinegar gave excellent results.—*New York Med. Journal.*

The Light about the Dental Chair.—The light at the operating chair may be very much improved in the late afternoon or on dark, hazy days by using white linen curtains as reflectors. The principal one is an ordinary roller shade fastened at the top of the window casing, the curtain to be the full width of the window and of sufficient length to allow of its being drawn out over the operating chair, above the operator's head, and attached to some fixed point in the wall or screen. The spring in the curtain fixture, if left uncaught, will be sufficient to keep the curtain taut. This curtain with its glazed white surface, sloping downward and backward from the top of the window opening, will direct the rays of light upon the operating field instead of permitting them to be dispersed into the room. The system of curtains may be carried much farther to good advantage. Broad white curtains may be attached to brackets swinging at right angles to the window frame, and adjusted at an angle that will direct the light-rays as desired. By this means the operating chair may be easily and quickly inclosed in a box having white reflecting sides. The dead white of the curtains seems to soften the intensity of the light so that it is not unpleasant to the patient and causes no particular eye-strain on the operator. The use of curtain reflectors has enabled me many times to continue operations without the aid of artificial light, which is the source of such a great strain on the eyes of both operator and patient.—Fred. C. Brush, *Dental Brief.*

Means and Methods for Obtunding Dentin.—Among the simpler methods used may be mentioned the application and the abstraction of heat, the former by projecting a current of hot air on the exposed surface, the latter by dropping some highly volatile fluid, such as alcohol, chloroform, or ether, into the cavity and allowing evaporation to take place. The depth to which either method obtunds is necessarily very limited and would require frequent repetitions to be of much service. There are certain drugs whose properties give them more or less obtunding power. Among these are the escharotics, such as carbolic acid, chromic acid, trichloracetic acid, and silver nitrate. Their action on the exposed ends of the dentinal tubules materially lessens the sensitivity of the dentin to pain. A group of drugs possessing astringent properties have also been used. The most common are zinc chlorid, tannic acid, and terchlorid of gold. Any one of these, combined with alcohol and placed in a cavity by means of a pledget of cotton some time previous to excavating, renders the operation much less painful. Some of the essential oils, such as oil of cloves and oil of cajuput, act as obtundents. They have not much immediate effect, but placed in the cavity for some time before

operating, they produce markedly good results. Drugs possessing anesthetic properties are among the most useful for obtunding purposes; aconite, atropin, camphor, chloral, and cocain are the principal of these. They have most effect where the dentin is not very compact, and the effect may be increased by means of pressure in applying them.—F. C. COLLINS, *Dental Register.*

The Possibilities of Surgery.—The story has often been repeated how Lord Lister as a young practitioner, announcing to Syme the great surgeon, whose daughter he had married, the fact that he was about to devote himself to surgery, was met with the discouraging statement that little remained to be done in surgery, and that there was no prospect of evolution in its art or practice that would ever make it worth while as a man's life-work. How Lister and a whole galaxy of workers have disproved this statement is now a matter of common history, and we cannot view the future without realizing the fact that it is replete with possibilities grand and far-reaching, and destined to exert an influence as great upon the sum of life and happiness as anything previously achieved. The announcement of Roentgen's discovery came down upon us well-nigh like a bolt from heaven, whose radiant light illumined a region which the wildest imagination of man had never conceived as issuing from darkness. What future there may be in the use of various rays of light is only hinted at by the recent achievements. The whole immense field of neoplastic pathology is, we feel convinced, destined to undergo a cultivation whose results may fill to overflowing the granaries of science. Anatomical knowledge and operative skill, we may be willing to acknowledge, have possibly already put forth the best that is within them. They constitute, however, but two of the myriad sides of modern surgery, to which physics, chemistry, and biology are destined to add so greatly that he would indeed be rash who ventured to forecast the future. We know not whither next will fall the light, but we know that the triumphs of perhaps a few years more to come are destined, if not to overshadow, at least to equal the wonders of the last generation gone.—*Internat. Journ. of Surgery.*

Oxygen in Combination with the Various General Anesthetics.—J. T. Gwathmey publishes (*Medical Record*, November 19, 1904) the results of an extensive series of observations made to determine the value of oxygen as an addition to general anesthetics. The conclusion reached is that oxygen increases the value of anesthetics as regards safety to life, and that without decreasing their anesthetic effect. The author's investigations were made upon a series of one hundred cats, chosen so as to present as little variation in size, etc., as possible. The animals were killed by means of the various anesthetics in common use, administered by means of a closed mask, and with the admixture of either air or oxygen, the time required being noted in each case. As a result of the figures so obtained the author says that, regardless of the anesthetic used, animals have lived twice as long with oxygen as when air was used. They usually die quietly with oxygen, and in convulsions with air. With oxygen, also, the heart continued to beat longer after respiration ceased. Efforts at resuscitation are more likely to be successful when oxygen has been used, and in private practice the after-effects of the anesthetic are reduced by this means. The experiments show that a mixture of chloroform and oxygen is more than twice as safe as chloroform and air, and is also safer than any of the other general anesthetics with air. This means that instead of having a very high mortality, chloroform given with oxygen is now as safe as ether. But all of the other general anesthetics are also increased in value by oxygen, and the use of this method of administration practically eliminates the percentage of danger which has hitherto been recognized as inseparable from the practice of anesthesia.—*Medical News.*

The Social Standing of Dentists.—Dentistry occupies a peculiar position in the social life of the world. It is a mixed profession; it labors with its hands as well as with its brains. It has in the past been largely recruited from the ranks of the semi-educated. The after-experiences have resulted, with many, in an educated body worthy to mingle in any of the refined circles of the world. The number of this class is necessarily limited, but the "curse of labor"—if it be a curse—still clings to these as individuals and the body they represent. The set who worship ancestors will have nothing to do with them. The worshippers of the golden idol will thrust them aside. They say, in substance, "The man who cleans teeth and handles instruments is unworthy to sit at my table." This is all very amusing, and yet is very natural, but why the man or woman who loves the work that dentistry offers should complain or feel grieved when debarred entrance to clubs or

societies is an incomprehensible problem to the writer.

That which is needed more than aught else in the dentistry of the period is not recognition by any set of men or women, but a mental poise that aspires to a higher standard of self and professional respect. The great demand of the best thinkers should be that dentists should cultivate a dignified deportment and aim for the best life possible in our profession, leaving nothing unattempted, however much may be unattained, that will make for the best. There is amply sufficient room in dentistry and in its social life to satisfy the most aspiring mind. Let it form its own clubs and not wait, hat in hand, while the ballots of the Golden Idol Club reject the applicant. He ought to be rejected; he is trying to enter doors barred against him. It is difficult to see any difference between the man demanding admission to a club and one knocking at the doors of private mansions insisting that he be placed on the visiting list. —James Truman, *Internat. Dental Journal.*

Quadruple Relation of Mastication to Gastric Digestion.—M. Dastre, professor at the Sorbonne, Paris, communicates a succinct statement, which may be regarded as the latest word of science respecting the relation of mastication to gastric digestion. We translate as follows:

(1) *Mechanical.* A division of the foodstuffs into small fragments. The gastric juice penetrates cubes of cooked albumin at the rate of about one millimeter per hour (Herzen, *Comptes rendus* de la Société de Biologie, 1886). It is clear that small particles—for example, cubes presenting on each side a surface of one square millimeter—will be penetrated in about one hour, while cubes with sides of one square centimeter will be penetrated only at the end of several hours.

(2) *Physical.* The extraction of food substances soluble in water. During mastication the saliva dissolves those alimentary substances which are soluble in water or in a neutral or alkaline aqueous liquid; but most of these substances act as pepsinogens (Schiff) or succagogs (Pawlow). The more prolonged the mastication, the greater will be the quantity of saliva secreted, and because of the extraction from the foodstuffs of pepsinogens and succagogs to the great benefit of gastric digestion, an increased quantity of gastric juice containing a greater quantity of pepsin is produced.

(3) *Chemical.* The saliva transforms alimentary starches into dextrin and sugar. Dextrin is one of the most powerful of pepsinogens; if one chews insufficiently, but little dextrin is produced, for the ptyalin ceases to act in an acid medium such as the gastric juice. It is true that the pancreatic juice takes up anew the digestion of the starches, but the dextrin absorbed by the small intestine is without pepsinogenic properties. It is necessary that it should be absorbed by the stomach. It is essential, then, that mastication should be prolonged to produce dextrin in large amount.

(4) *Secretory.* Pawlow has proved that the mucous membrane of the stomach is innervated, from the secretory point of view, by the pneumogastric and the sympathetic. The first is the centrifugal path of the cerebrogastric reflex. The point of departure for this reflex may be either subjective (psychic reflex) or sensory (sensory reflex). It may be produced by visual and auditory sensations, but it is especially excited by olfactory and gustatory sensations, under the influence of which the gastric juice flows abundantly. Now, the mastication of a sapid substance intensifies gustatory sensations, and consequently reinforces the sensorial gastric secretory reflex.

These different phenomena are intimately related to one another. The more one chews, the more freely the saliva flows; the more saliva, the larger the amount of pepsinogens and of succagog substances brought into solution, and at the same time the gustatory sensations, which are the point of departure of the gastric secretory reflex, are prolonged and reinforced.—*Modern Medicine.*

A Peculiar Infection of the Mouth, Tonsils, and Pharynx.—H. R. Oliver, San Francisco (*California State Journal of Medicine*, August 1904), makes a preliminary report on sixteen cases of a peculiar infection of the mouth, tonsils, and pharynx observed during the past year. Three cases of the acute form of the disease were seen in children under twelve; all chronic cases were in patients over twelve years. The first symptom is a hard, dry, itchy, paroxysmal cough, dysphagia, coryza, frontal neuralgia, aching of back and limbs. The tongue is coated and strawberry-like, tonsils intensely hyperemic, as are also the uvula and post-pharyngeal walls. Tonsils and uvula enlarge until they nearly meet. The tonsil is covered with a thin, grayish-white membrane, the uvula clean. The cervical and submaxillary glands are swollen and tender. The temperature ranges from normal to 103° F. The mem-

brane on the post-pharyngeal wall forms a definitely outlined V, and is elevated, pearl-gray, adherent, and bleeds if disturbed. Small gray elevated patches, hard and firmly attached, appear on the tongue, usually in the center but sometimes extending to the tip and over the sides. In the progress of the case these originally discrete patches may become confluent. The pharyngeal wall clears first, later the patches on the tonsils slough off, leaving punched-out grayish ulcers. The patches on the tongue also slough out, leaving deep irregular ulcers. The adenopathy subsides, the temperature falls, but some dysphagia remains, with a hacking cough and hoarse voice. The ulcers persisted in a strong, athletic man of thirty years for three months, and in a healthy man of fifty years for six months.

Cover-slip smears from patches showed numerous bodies round or ovoid in shape except for a large chromatin granule at the thick end, joined by the constricted neck of a long thread which may or may not be jointed, and may be branched. They take stain slightly, except for spots which stain deeply and are connected with each other by a filament of deeply staining chromatin substance. They stain by Gram's method and all the basic anilin dyes. Pure cultures are difficult to obtain, as are also cultures on artificial media. Oliver succeeded with 8 per cent. glucose agar to which was added 1 per cent. HCl. He obtained pure cultures in nine cases. They grow slowly—six or seven days. The more severe the case the more threads form and the more adherent the growth. The growth is thick, opaque, moist, and elevated. Pure growths on agar can be transplanted to other media. Gelatin is not liquefied. Litmus milk is unchanged. Potato: thick, opaque white growth. Bouillon: no cloud, but heavy sediment. Glucose agar not fermented. Rabbits infected by intraperitoneal inoculation or introduction of cultures into the general circulation died in from three and a half to five days and exhibited abscesses in heart, kidneys, liver, spleen, adrenal body, lymph-glands, peritoneum, pericardium, brain, and parotid, and pure cultures were obtained from all these organs and from the urine.

Descriptions of the microscopic findings are given in detail. That the disease is contagious is proved clinically by two instances of three patients in one family becoming infected one after another, and by the disease attacking one of the doctors subsequently working at the post-mortem table in the laboratory where the infected rabbits had been autopsied.—*Cincinnati Lancet-Clinic.*

The Early Care of the Teeth.—The necessity for early care of the teeth becomes more and more apparent to the public as the good effects of modern improvements in sanitation and better conditions of life make themselves felt throughout the civilized world. Yet there are numbers of highly intelligent, well-educated people who look upon the teeth as structures which are more or less able to take care of themselves, even in adult life, and who receive the suggestion that the teeth of children should be carefully cleaned and attended to with surprise and even incredulity. It is no uncommon thing for children of five or six years of age and younger, whose mouths present a deplorable spectacle of decayed and missing organs of mastication, to be brought to the dentist with a request for extraction of one or more of the deciduous teeth. It does not seem to occur to parents that sound teeth are as important to children of tender years as to their seniors. How can the little ones be expected to develop into healthy men and women if they are deprived of efficient means of triturating their food at a time when good nourishment is more than at any other time a vital necessity? There are, of course, parents who make a point of taking their children to have their mouths examined and put in order by a dentist with praiseworthy regularity, and it is quite the exception to find any objection or fear on the part of these little patients after the first visit or two. Indeed, many of them look forward with pleasure to these occasions, and regard the dentist in the light of a kind friend. The question is more than a domestic one, it is of national importance. The good physique of the race depends to an incalculable extent on the efficiency of the teeth of all classes, and where we see mouths in a condition which renders mastication a mere pretense we cannot expect to find good bone and muscle.

A decayed tooth would seem at the first glance to be a trivial matter, but if the public generally could be shown the cases which come under treatment daily at the dental hospitals their eyes would be opened to the appalling consequences which may ensue from the neglect of nature's danger signal. Dentists should point out to their patients that toothache—that ill which even philosophers have not the patience to endure—is a note of warning from beneficent nature, telling the sufferer that there is something wrong and urging him to delay no longer in seeking means to rectify it.

Mothers should be told to clean the teeth of the baby as soon as they are in place, and if decay appears in spite of precautions, to

take the little one forthwith to make the acquaintance of the dental adviser, who will find a way to allay the pain and to preserve the tooth. To preserve the tooth; that is the point which should be insisted upon. Extraction of temporary teeth, except in those cases where it is called for to enable the permanent teeth to take up their proper positions, or for some good and sufficient reason to be determined by a properly trained dental surgeon, should be a thing of the past.

One word as to the consequences of neglect of the teeth in case these lines should meet the eye of any who are not versed in dental care. Abscesses bursting below the jaw or high on the cheek, leaving an unsightly scar for life; chronic dyspepsia, anemia, toxic neuritis, septic pneumonia, and a host of ills which would not be willingly encountered by anyone in his senses—these are some of the dangers which lurk in the darkness of ignorance and negligence, and it is earnestly to be hoped that the spread of knowledge which accompanies the advance of civilization may lead, for the sake of the nation at large, to the care of the teeth from their earliest appearance being one of the first considerations in every home.—*Dental Surgeon.*

HINTS, QUERIES, AND COMMENTS.

IMPLANTATION OF A PORCELAIN TOOTH.

In June 1902, a patient, a man aged forty, called upon me, suffering from a chronic abscess above the upper right lateral incisor root, which was crowned with a "Richmond." I treated it occasionally until May 1903, but without any success. The entire labial wall of the alveolus being absorbed, and as the fistula was midway between the cervix and the apex, I diagnosed the case as one of perforated root—which, upon extraction, proved to be the case. The patient insisted on having a natural tooth implanted to replace the lost organ. Accordingly I first procured an excellent specimen that had been extracted ten days previously, implanted it, and because of the long overbite—the lower labial surfaces of the oral teeth articulating with the entire lingual surfaces of the upper oral teeth—I struck up a plate of No. 28 gage and reinforced it with 20-k. gold solder. I fastened it with wire to the adjoining teeth, covering the entire lingual surfaces of the upper oral teeth, thus firmly retaining the implanted tooth in a fixed position and relieving it of any direct strain.

It remained in this position for a period of four months. The gum in the interval assumed a healthy tone and tightly embraced the neck of the implanted tooth, but without showing any attachment to the surrounding osseous area. Upon the removal of the splint the tooth could be easily withdrawn, but there was sufficient suction to retain the tooth *in situ.*

Owing to the complete absorption of the alveolus on the labial side, retention by natural processes became at once questionable. The patient again insisting upon implantation, I conceived the idea of having an all-porcelain reproduction of the missing lateral made, with the root slightly larger, ending in a nodular form, and the surface corrugated, thus affording an opportunity for possible retention by healthy bone formation around the porcelain root.

As I am decidedly opposed to the use of gold-shell crowns, open-face crowns, or the wanton destruction of healthy pulps in good but filled teeth, and as the adjoining central and canine teeth had an approximal gold filling exposed lingually, I had fused into the crown of the porcelain tooth strong S. S. W. double-headed plate tooth-pins opposite the fillings, into which I drilled pits to accommodate the heads of the pins, filling around them, thus obtaining a strong anchorage. I discovered, in August 1903, that the independent movement demanded by each one of the three teeth loosened the anchorage and broke off one pin. I then removed the tooth, replaced the broken pin and filed off the heads to a blunt end, replaced the fillings, and simply drilled seats to cradle the ends of the pins, making a firm resisting socket and at the same time allowing for independent movement without undue strain. Incidentally I may state that

this I consider to be the only proper anchorage for small bridges.

I have seen the case repeatedly since the final adjustment in August 1903, and it now (November 1904) presents a very natural appearance and is free from any soreness, the parts being healthy and useful.

The restoration of the missing lateral without any destruction of tooth-substance or any visible signs of attachment pleased the patient and was most gratifying to the operator.

I am indebted to Drs. J. C. Wertz of Easton, Pa., and C. N. Kratzer of Reading, Pa., for kind assistance in fashioning the porcelain tooth.

The case was reported before the Reading Dental Society.

C. R. Scholl.

RULE FOR THE PREPARATION OF AQUEOUS MEDICINAL SOLUTIONS OF DEFINITE PERCENTAGE.

My attention has been recently called to an item in the November issue of the *Dental Review*, wherein, on page 1139, the following rule is given for the preparation of percentage solutions: "Multiply 480 by the per cent. desired and point off two right-hand figures. The figures at the left of the separatrix will give the number of grains or drops; 480 is the number of grains to the ounce."

Apparently no discrimination has been made in the article in question between the grain and the minim. It is true that the troy or apothecaries' ounce has 480 grains, and therefore the preparation of proportionate mixtures of solids has to be calculated upon the basis of 480. But, in the preparation of mixtures of solid substances in liquid vehicles, due consideration must be given to the weight in grains of the volume of the excipient to be employed. Thus, for obtaining cocain solutions in water we must calculate upon the basis of 456 grains—the weight of one ounce of distilled water. To work on the basis of 480 grains to the ounce would result in the making of solutions which as a matter of fact would contain more medicinal material than intended by the prescriber.

From the foregoing fact we deduce the following rule for the preparation of definite percentage solutions: *Multiply 456 by the percentage and divide by 100, the result being the weight in grains of the agent that should be added to one ounce of distilled water.*

Julio Endelman.

OBITUARY.

DR. STEPHEN G. STEVENS.

Died, September 5, 1904, at his home in Boston, Mass., from apoplexy, Stephen G. Stevens, D.D.S.

Dr. Stevens was born at Brooks, Maine, in 1844. He enlisted as a soldier in the civil war, being a member of Company D, New York Frontier Cavalry.

He began his professional career in Lynn, Mass., and while practicing dentistry attended lectures at the Boston Dental College, graduating with the class of 1877. Soon after this he bought the practice of Dr. R. S. Robbins, and moved to 175 Tremont st., Boston, where he practiced for many years. Afterward he moved to Commonwealth ave., where he was in practice up to the time of his death.

In his chosen profession Dr. Stevens filled many offices of honor and responsibility. He was a trustee and auditor of the Boston Dental College for many years. He was an ex-president of the Massachusetts Dental Society, the Connecticut Valley Dental Society, and the Northeastern Dental Society, as well as of the Alumni Association of the Boston and Tufts Dental School. He was a fellow of the American Academy of Dental Science, and also a member of the Boston Society of Dental Improvement.

Students always found in him a firm friend and adviser. In the conduct of the college he was a strong advocate of whatever seemed best to him for a sound professional education. His nature was that of a strong, sin-

cere, and positive man; and this quality gained for him the respect of all who knew him.

Dr. Stevens' death occurred suddenly and unexpectedly. He leaves a widow.

The Association of the Boston and Tufts Dental School offered the following resolution expressive of its grief at the death of one of its valued members:

Whereas, for many years Dr. Stevens was one among us, honored and trusted; one who, by his kindly and helpful nature, won our warmest affection. In our College he was an honored officer, energetic for the advancement of the profession he loved. By those of us who knew him his memory will long be cherished. We shall miss him and we mourn his death. Therefore be it

RESOLVED, That the above be placed on a page of our records. Also that a copy be sent to Mrs. Stevens and to the dental journals.

R. R. ANDREWS,
GEORGE T. BAKER,
EDWARD W. BRANIGAN,
For the Committee.

DR. CHARLES PARKER SAWYER.

DIED, at Skowhegan, Me., November 1, 1904, of a rheumatic affection, Dr. CHARLES PARKER SAWYER, in his sixty-fifth year.

Dr. Sawyer was born in Madison, Me., in 1840. At the age of twenty-eight he moved to Skowhegan, and entered the office of Dr. Henry Leavitt, with whom he studied dentistry for about one year, removing at the end of that time to Dexter, Me., where he resided until 1887. In the latter year he went to South Bend, Ind., and after a brief residence in that place removed to Skowhegan.

Dr. Sawyer enjoyed excellent health until about 1889, when he developed a rheumatic tendency from which he was never afterward permanently relieved. For the past seven years the malady has been very severe, and two years since it compelled his retirement from the practice of his profession.

Dr. Sawyer was married in 1860 to Miss Frances O. Williams of Madison, whose death occurred October 7, 1901.

The many true friends of Dr. Sawyer will ever remember his gentlemanly manner and abundant geniality, and sincerely regret his loss. He was successful in the practice of his profession and was a man of good general information. He took much interest in the fraternal orders and was a member of several such organizations.

His mother, Mary D. Sawyer, now in her ninety-fifth year, survives him, and he is also survived by three sons: Albert L., a citizen of Lisbon Falls, Me.; Fred O., of Skowhegan, Me.; and Ralph M., of New York city.

DR. EDWIN HERBERT BROCK.

DIED, at his residence, 31 Ocean st., Lynn, Mass., December 4, 1904, of apoplexy, EDWIN HERBERT BROCK, D.D.S., in his sixty-third year.

Dr. Brock was born in Stafford, N. H., July 10, 1842. In 1878 he went to Boston, where he began the study of dentistry in the office of Dr. Gaylord. After a short period of apprenticeship he matriculated in the Boston Dental College, from which institution he received the D.D.S. degree in 1882.

Dr. Brock from the beginning of his professional career gave evidence of possessing that degree of activity, intelligence, and sound logic which evenually lead to professional success. While at college the highest honor in the domain of studentdom was bestowed upon him by his admiring classmates, who elected him to the presidency of his class. He held membership in the alumni society of his alma mater and in the Lynn Dental Association, being the president of the latter body at the time of his decease.

He was married in 1868 to Miss Edna Eastman Coswell of Lynn, who survives him, together with a son, Dr. Carl S. Brock, a dental practitioner of Lynn.

SOCIETY NOTES AND ANNOUNCEMENTS.

NATIONAL DENTAL ASSOCIATION (SOUTHERN BRANCH) AND TENNESSEE DENTAL ASSOCIATION.

THE eighth annual meeting of the Southern Branch of the National Dental Association will meet jointly with the Tennessee Dental Association at Memphis, Tenn., February 21, 22, and 23, 1905.

Special railroad rates: one and one-third, certificate plan.

J. A. GORMAN, *Cor. Sec'y*, Asheville, N. C.

MONTANA STATE DENTAL SOCIETY.

THE second annual meeting of the Montana State Dental Society will be held in Butte, Mont., February 20, 21, and 22, 1905.

Arrangements are being made for the coming meeting to be the very best ever held in the Northwest.

Two men from the East will be present to give clinics in both porcelain inlays and gold fillings.

Address all communications and applications for membership to

GEO. E. LONGEWAY, *Sec'y*,
Great Falls, Montana.

SOUTHEASTERN IOWA DENTAL SOCIETY.

THE second annual meeting of the Southeastern Iowa Dental Society will be held in Burlington, Iowa, January 9 and 10, 1905.

WM. M. TERRY, *Sec'y*,
Washington, Iowa.

WOMAN'S DENTAL ASSOCIATION.

THE Woman's Dental Association has been holding regular monthly meetings, which have been well attended. Clinics on porcelain work, orthodontia, and the reading of papers have been the principal interests.

The next monthly meeting will be held at 225 South Sixteenth st., Philadelphia, Saturday, January 7, 1905, at 2 P.M. Dr. Belle Whitcomb will give a clinic and also read a paper.

ELIZA YERKES, *Sec'y*.

NEW YORK COLLEGE OF DENTISTRY.

REUNION—CLASS OF '91.

THE annual reunion of the class of '91, New York College of Dentistry, will be held in New York city, January 14, 1905. Members of the classes of '90 and '92 are cordially invited to participate.

Further information may be obtained from

W. H. MCCUTCHEON,
487 Clinton ave., Brooklyn, N. Y.

NORTHWESTERN UNIVERSITY DENTAL SCHOOL.

THE Alumni Association of Northwestern University Dental School will hold its annual clinic on Tuesday, January 17, 1905, at University Building, corner Lake and Dearborn sts., Chicago, Ill. All members of the profession are cordially invited.

For exhibiting space, address Dr. C. R. E. Koch, Lake and Dearborn sts., Chicago.

F. W. GETHRO, *President*,
G. B. MACFARLANE, *Sec'y*,
70 State st., Chicago, Ill.

NEW YORK ODONTOLOGICAL SOCIETY.

THE thirty-eighth anniversary meeting of the New York Odontological Society will be held Tuesday, January 17, 1905, at the New York Academy of Medicine, No. 17 West Forty-third st. The afternoon will be devoted to an interesting series of clinics, which will be given from two to five o'clock.

An important paper on "Porcelain" will be presented at the evening meeting, which will be followed by a collation.

W. D. TRACY, *Cor. Sec'y*.

KENTUCKY STATE DENTAL ASSOCIATION.

The next annual meeting of the Kentucky State Dental Association will convene at Lexington, Ky., May 15 and 16, 1905.

We anticipate a most pleasant as well as profitable meeting, and a cordial invitation is extended to the profession.

W. M. Randall, *Sec'y*,
Masonic Bldg., Louisville, Ky.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

The next meeting of the Dental Society of the State of New York will be held at Albany, N. Y., May 12 and 13, 1905. We expect a large attendance.

Papers will be read by Dr. E. T. Darby, Philadelphia; Drs. S. G. Perry, and R. Ottolengui, New York; Drs. J. P. Buckley, W. T. Reeves, and A. H. Peck, Chicago.

The clinic committee, of which Dr. F. W. Proseus is chairman, are hard at work arranging an interesting program.

W. C. Deane, *Sec'y*.

G. V. BLACK DENTAL CLUB.

At the second annual meeting of the G. V. Black Dental Club of Chicago the following officers were elected for 1905: F. W. Parker, president; F. W. Gethro, vice-president; R. W. Parker, secretary and treasurer.

Ralph W. Parker, *Sec'y*.

SOUTH DAKOTA STATE DENTAL SOCIETY.

The twenty-second annual meeting of the South Dakota State Dental Society was called to order on the morning of June 7, 1904, in the Brown county court-house in Aberdeen, S. D., President C. E. Stutenroth being in the chair.

Minutes of the last meeting were read, corrected, and approved.

The regular order of business was suspended, and President Stutenroth introduced Dr. E. K. Wedelstaedt, St. Paul, who gave a talk and essay, illustrated by models and materials, demonstrating his method of packing gold. Discussion was opened by Dr. D. St. I. Davis and Dr. Collins, and became general.

Dr. W. D. James, Tracy, Minn., was then introduced, and occupied the afternoon with an essay on the anatomical occlusion of artificial teeth, followed by the exhibition of a number of models taken from practical cases in his practice.

June 8th.

Dr. E. K. Wedelstaedt opened the morning session with a clinic on filling with gold a mesio-occlusal cavity in an upper left molar.

At 1.40 P.M. the meeting was called to order for the transaction of business.

The membership was increased by eight members.

At 2 P.M. Dr. Wedelstaedt again took the platform, and demonstrated several different methods of packing gold, using a large plaster model tooth, and clay as the filling material; also filling a simple occlusal cavity, using soft and cohesive gold, separately and in combination. He followed with a talk on the lack of unity in our efforts, and extended to the members an invitation to attend the meeting of the G. V. Black Dental Club of St. Paul, Minn.

At 2.45 Dr. Field gave a clinic on filling with gold an approximal cavity in a premolar.

Dr. W. G. Collins demonstrated a method of making a perfect metal die without the use of cores or sand.

Dr. R. J. Lamme gave a table clinic on gold inlaying.

Dr. Carl O. Fossum soldered a gold filling in a porcelain-face crown, making but one investment.

Dr. W. H. Jackson filled with amalgam a mesio-occlusal cavity in an upper left premolar.

ELECTION OF OFFICERS.

The following officers were elected for the ensuing year: R. J. Lamme, president; James A. Robertson, vice-president; A. W. Fossum, Aberdeen, S. D., secretary; L. F. Straight, treasurer. Executive Committee—Drs. O'Neill and McCartney (as additional members). Dr. C. E. Stutenroth and Dr. F. N. Palmer (to succeed himself) were nominated for membership of the State Examining Board.

Adjournment to meet in June 1905, at Mitchell, S. D.

J. W. Ross, *Sec'y*.

OHIO STATE DENTAL SOCIETY.

At the thirty-ninth annual meeting of the Ohio State Dental Society, held in Columbus, December 6, 7, and 8, 1904, the following officers were elected: S. D. Ruggles, Portsmouth, president; H. L. Ambler, Cleveland, first vice-president; H. C. Brown, Columbus, second vice-president; F. R. Chapman, Columbus, secretary; C. I. Keely, Hamilton, treasurer.

F. R. Chapman, *Sec'y*,
305 Schultz Bldg., Columbus, Ohio.

FRATERNAL DENTAL SOCIETY OF ST. LOUIS, MO.

At the annual election of the Fraternal Dental Society of St. Louis, Mo., December 20, 1904, the following officers were elected for the ensuing year: Burton L. Thorpe, president; E. P. Dameron, vice-president; S. H. Voyles, secretary; W. E. Brown, treasurer.

S. H. Voyles, *Sec'y*, St. Louis, Mo.

LINCOLN (NEB.) ODONTOGRAPHIC SOCIETY.

At the last regular meeting of the Lincoln Odontographic Society it was decided to hold the first annual midwinter clinic, January 16 and 17, 1905, beginning at 1.30 p.m. on the 16th.

The following were elected as the Executive Committee to have charge of all arrangements and preparation of program: Dr. M. E. Vance chairman, Dr. L. P. Davis, and Dr. E. G. Antrim. Superintendents of Clinics—Dr. W. R. Clark and Dr. M. O. Frazier.

The meeting is to be held in the infirmary of the Lincoln Dental College, and a cordial invitation is extended to all members of the profession.

M. E. Vance, *Chairman*.

At the annual meeting of the Lincoln Odontographic Society, held Monday evening, December 12, 1904, the following officers were elected for the ensuing year: H. Finley Helms, president; M. E. Vance, vice-president; F. B. Damron, secretary and treasurer. Executive Committee—M. E. Vance (chairman), E. G. Antrim, L. P. Davis. Board of Censors—W. T. Humphrey, P. J. Bentz.

F. B. Damron, *Sec'y*.

PENNSYLVANIA ASSOCIATION OF DENTAL SURGEONS.

The fifty-eighth annual meeting of the Pennsylvania Association of Dental Surgeons was held at the Continental Hotel, Philadelphia, October 11, 1904. The following officers were elected for the ensuing year: M. I. Schamberg, president; Albert N. Gaylord, vice-president; J. Clarence Salvas, secretary; Wm. H. Trueman, treasurer and librarian.

J. Clarence Salvas, *Sec'y*.

LASALLE COUNTY DENTAL SOCIETY.

The LaSalle County Dental Society, a component part of the Illinois State Dental Society under the recent reorganization, was organized at Streator, Ill., October 24, 1904. The following officers were elected for the ensuing year: C. R. Taylor, president; C. S. Morsman, vice-president; T. H. Barrett, treasurer; L. E. Jordan, secretary; R. D. Moran, librarian. Program Committee—H. P. Dorsey. Membership Committee—P. J. Wendel.

The next meeting will be held February 14, 1905, at LaSalle, Ill.

L. E. Jordan, *Sec'y*.

LOS ANGELES ASSOCIATION OF DENTAL ALUMNI.

At the annual meeting of the Los Angeles Association of Dental Alumni, held December 6, 1904, the following officers were elected: G. Maurice Crow, president; J. F. Kern, vice-president; Ray D. Robinson, secretary and treasurer. Member of Board of Directors—J. Walter Gray.

Many eastern dentists visit our city during the winter months, and to such we extend a hearty invitation to attend and take part in our meetings, held on the first Tuesday of every month.

Wm. Bebb, *Cor. Sec'y*.

INDIANA BOARD OF DENTAL EXAMINERS.

THE Indiana Dental Board will hold its next regular meeting at the State-house in Indianapolis, Ind., on January 10, 1905.

The examination will begin at 9.30 A.M. on that day. Applications should be filed with the secretary by January 5th.

F. R. HENSHAW, *Sec'y*, Middletown, Ind.

DISTRICT OF COLUMBIA BOARD OF DENTAL EXAMINERS.

THE semi-annual examination of the Board of Dental Examiners of the District of Columbia will be held January 4, 5, and 6, 1905, at the Dental Department of the Georgetown University, 920 H street, N. W., Washington, D. C.

All applications for examination must be accompanied by a fee of ten dollars, and should be filed with

WM. E. DIEFFENDERFER, *Sec'y*,
Colorado Bldg., Washington, D. C.

ARIZONA BOARD OF DENTAL EXAMINERS.

THE Board of Dental Examiners of Arizona will meet in Phœnix, Ariz., February 23, 24, and 25, 1905, for the examination of all candidates desiring a license to practice dentistry in Arizona. Applications must be filed before February 18th, and all applicants must come prepared with instruments. Fee twenty-five dollars.

WM. G. LENTZ, *President*,
Fleming Block, Phœnix, Ariz.

WISCONSIN BOARD OF DENTAL EXAMINERS.

THE next meeting of the Wisconsin State Board of Dental Examiners for examination of candidates for license to practice dentistry in Wisconsin will be held in Milwaukee, January 30, 1905.

Application must be made to the secretary fifteen days before examination. The candidate must be a graduate of a reputable dental college, or have been engaged in the reputable practice of dentistry consecutively for four years, or an apprentice to a dentist engaged in the reputable practice of dentistry for five years.

For further particulars apply to

J. J. WRIGHT, *Sec'y*,
1218 Wells Bldg., Milwaukee, Wis.

ARMY DENTAL CORPS.

SUPERVISING Dental Surg. John H. Hess, to report to the commanding general, Department of California, for transportation to the Philippine Islands on the transport to sail from San Francisco, Cal., on or about Feb. 1, 1905. (Dec. 1, W. D.)

Leave for one month is granted Examining and Supervising Dental Surg. Robert T. Oliver. (Dec. 1, W. D.)

The leave granted Contract Dental Surg. George L. Mason is extended twenty-three days. (Nov. 29, D. G.)

Contract Dental Surg. Julien R. Bernheim, to Camp McGrath, Batangas, for duty. (Nov. 3, D. Luzon.)

Contract Dental Surg. George I. Gunckel, having reported, is assigned to duty at Camp Marahui, Mindanao. (Oct. 17, D. Mindanao.)

BILLS BEFORE CONGRESS.

S. 5906—Mr. Pettus: To reorganize the corps of dental surgeons attached to the Medical Department of the Army. Provides for a corps of dental surgeons not to exceed in number the actual requirements nor the proportion of one to one thousand. Said corps to consist of three grades designated assistant dental surgeon, passed assistant dental surgeon, and dental surgeon, and with respect to rank, pay and allowances and to promotions within said dental corps grades named to correspond to the grades of the medical corps designated assistant surgeon, passed assistant surgeon, and surgeon respectively. Original appointments to be made to grade of assistant dental surgeon, appointees to be citizens of the United States between twenty-one and twenty-nine years of age, graduates of standard dental colleges, of good moral character, of unquestionable professional repute, and to pass usual physical and professional examination. Provided, That contract dental surgeons attached to the Medical Department of the Army at the time of the passage of this act may be appointed, three to the grade of passed assistant dental surgeon, and others to the grade of assistant dental surgeon.

SWEDISH DENTAL SOCIETY.

NOTICE OF PRIZE COMPETITION.

THE Swedish Dental Society announces the opening of a competition for the writing of a popular treatise, to be entitled "The Teeth and Their Care," intended for liberal distribution by the members of the society among persons of those classes in which hygienic care of the mouth is practically unknown. The treatise must be written in the Swedish language, and must not exceed one printed sheet. The competition is open to all members of the dental profession.

Each essay should bear a motto or mark, and should be accompanied by a sealed envelope containing on the outside the same motto or mark, but bearing no indication as to its origin, and within containing the name and address of the author. The essay, preferably typewritten, should be forwarded, duly signed, not later than February 28, 1905, to the "Jury of the Swedish Dental Society," 19 Drottninggatan, Stockholm.

The committee appointed to pass on the merits of the essays that may be submitted will primarily consider whether they fulfill the purpose of a popular treatise on the teeth and their care intended for the instruction of the rising generation in the schools and the information of the lower classes of the people. The essay should embody a plain and easily assimilable statement of the subject, free from dry details and needlessly lengthy descriptions. Original illustrations or reproductions of any already published may be incorporated to facilitate the understanding of the text. Authors should base their statements on strictly scientific facts, excluding hypotheses and doubtful theories.

The awards will be—First prize, 700 kroner ($185); second prize, 300 kroner ($80).

The jury appointed by the society consists of the following members: Profs. E. Almqvist and A. Lindström, with Prof. C. Wallis as alternate; also, Drs. V. Bensow, E. Förberg, and G. Forssman, with Dr. G. Modin as alternate.

The prize essays to become the property of the Swedish Dental Society.

On behalf of the Swedish Dental Society,

EMIL CHRISTENSON,
HARALD RAMBERG.

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING NOVEMBER 1904.

November 1.

No. 774,045, to CHARLES A. DAVIS. Artificial tooth.

November 8.

No. 774,253, to JAMES E. KEEFE. Tooth-cleaner.

November 15.

No. 774,816, to LISLE H. BABCOCK. Matrix band retainer.

No. 774,838, to LEON H. C. DE FERNELMONT. Dental tooth-pin pointing tool.

No. 774,879, to WILLIAM H. HULLHORST. Instrument holder for dentist.

No. 775,083, to JAMES W. IVORY. Clamp for dental dams.

November 29.

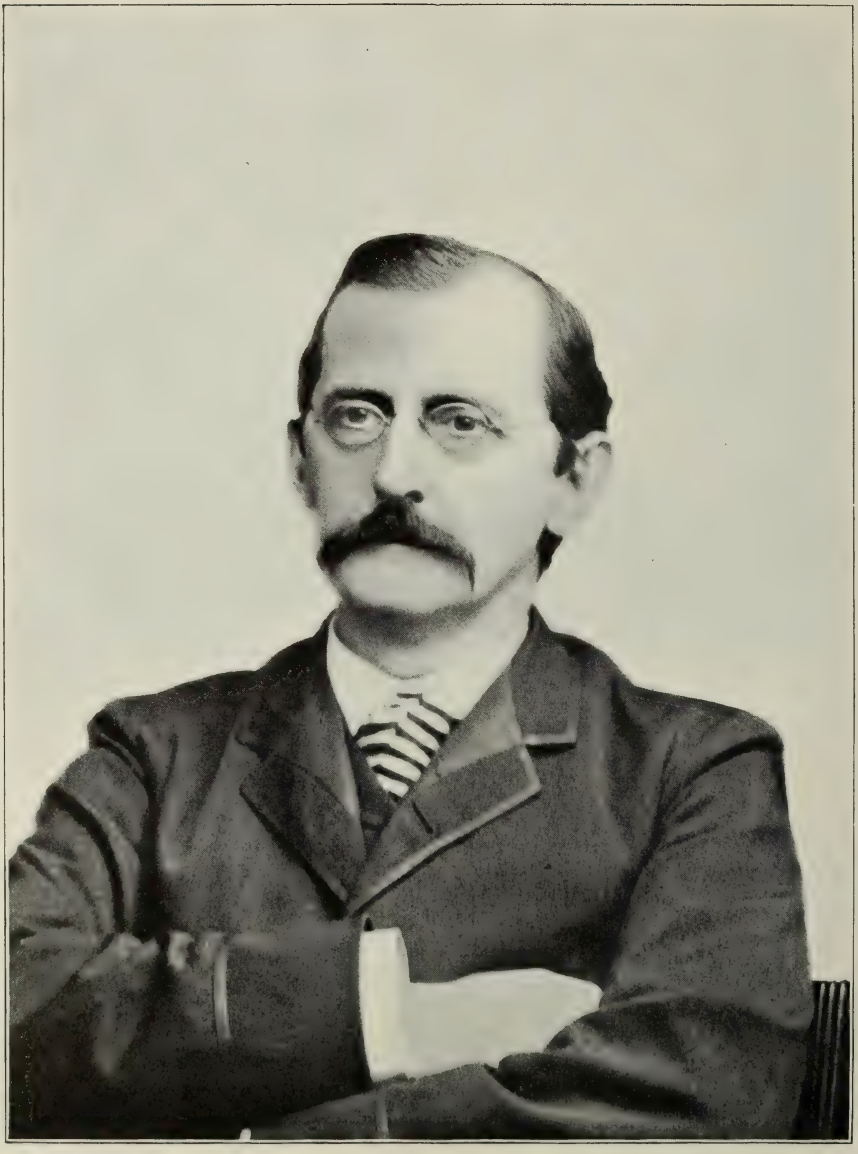
No. 776,114, to AMOS N. COATES. Mold for seamless crown swager.

No. 776,204, to ALSON C. SARGENT. Dental handpiece.

No. 776,302, to JAMES G. CROCKETT. Cheek distender.

No. 776,348, to GEORGE H. PARSONS. Dental dilating forceps or appliance for dental or surgical use.

No. 776,466, to FRANK K. HESSE. Handpiece for dental engines.



DR. E. T. STARR.

THE

DENTAL COSMOS.

VOL. XLVII. FEBRUARY 1905. No. 2.

ORIGINAL COMMUNICATIONS.

IS THERE UNCALCIFIED TISSUE IN THE ENAMEL?

By DOUGLAS E. CAUSH, L.D.S.I., Brighton, Eng.

(Presented to Section I, Fourth International Dental Congress, St. Louis, Mo., August 31, 1904.)

IN discussing this question, "Is there uncalcified tissue in the enamel?" we are going over ground that has previously been much discussed; yet I think there is still matter for thought, and the paper, being the result of some original work, will, I trust, prove acceptable to you.

In England, Chas. Tomes, Leon Williams, and many others, deny the existence of uncalcified tissue in this structure. On the continent of Europe there is a difference of opinion, some denying, whilst others strongly affirm, that uncalcified tissue does exist in the enamel. In America there is also a diversity of opinion, and we have, as a consequence, the greatest difficulty in arriving at any definite conclusion upon this important subject.

At the present time all writers are agreed that the enamel is developed from the epiblast, and that this, in the early stages of development, consists of nothing but uncalcified tissue; as the development proceeds, a portion of this tissue becomes calcified, and with the commencement of the calcification the difference of opinions begin.

Most English writers state that the calcification of this tissue is so perfect that the whole of the enamel is eventually composed of nothing but inorganic salts and water; but, at the same time, they do not satisfactorily state what becomes of the original uncalcified matrix.

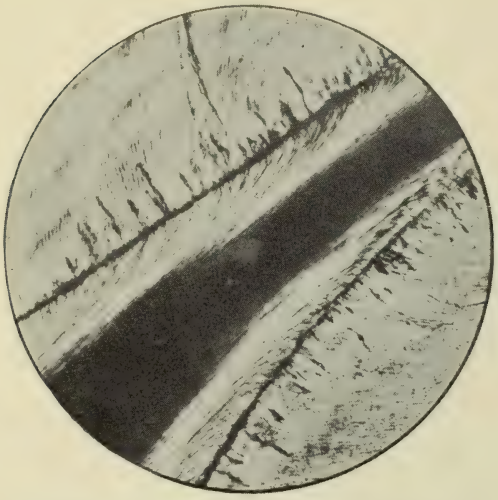
Some writers, to confirm their theories, rely upon the chemical composition of the enamel as shown by an analysis of this substance; but, unfortunately for their theories, no two analyses of this tissue give the same results, and owing to this difference any dependence upon a given analysis is not possible. I have therefore, in my endeavor to unravel some of the mysteries of this complicated problem, devoted my attention to the microscopical aspect of this subject, and by special methods of staining have sought to obtain some light on Nature's work with this tissue.

The photomicrographs illustrating this paper are from sections of teeth stained by special processes about to be described,

so that any who are interested in this matter can prove for themselves the theories advanced; whilst the deductions drawn are from the microscopical examination of some hundreds of sections of teeth, both of man and animals, that have been prepared for this purpose.

My attention was first drawn to this subject by watching the action of copper amalgam upon the enamel. I noticed that the enamel of dead teeth always stained more than the enamel of those

Fig. 1.



Section of incisor, showing stained enamel spindles and stained tissue between the prisms. (Magnified 100 diameters.)*

teeth in which the pulp was alive, and concluded that if the enamel contained no uncalcified tissue this should not have been the case, as in perfectly calcified tissue there should be no action by the filling except upon the exposed surface.

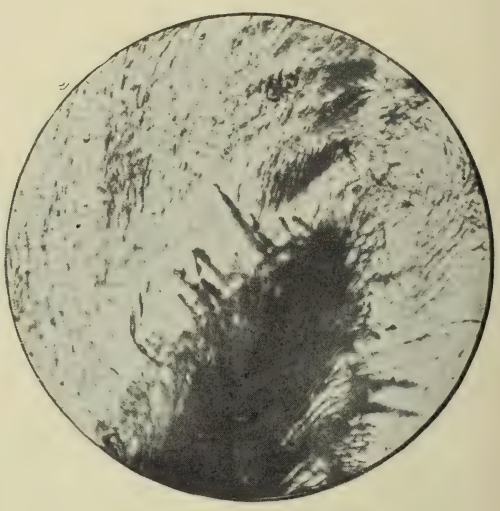
Realizing this fact led to my carrying out a series of experiments with the object of staining any uncalcified tissue, should it exist in the enamel; and it is the result of these experiments, with what they teach, I wish to bring before you. Of the various staining processes tried, the two about to be described are the simplest, while the most efficient, either of them giving very good results.

*[The original photomicrographs have been reduced one-third in the process of reproduction.—Ed.]

METHODS OF STAINING.

First method. Take any tooth you wish to stain and place it in alcohol from six to ten days, to harden the pulp or to remove any air in the tissue of a dry tooth; then place it in an alcoholic stain of fuchsin for about a fortnight. At the end of that time take the tooth out of the stain and grind it down on a lathe until it is fairly thin; then finish by rubbing the section down between two

Fig. 2.



Spindles. (Magnified 200 diameters.)

pieces of ground glass with a little pumice powder moistened with water. When the section is thin enough, dry thoroughly, and mount in balsam.

Second method. Place a tooth in alcohol, as in the previous method, and when the tooth is taken out of the alcohol place it in a hot saturated solution of fuchsin. Then put the tooth and stain in a hot chamber for twenty-four hours; allow the stain to cool, when the tooth will be ready for grinding down. This method gives very good results but makes the enamel more brittle than the slower method. For examination under the microscope it is necessary to use a compensating ocular magnifying 18 diameters, and an apochromatic objective of about 16 mm.

In all cases the staining must be accomplished prior to the cutting of the sections from the teeth, and in no case must acids of any kind be used or there will be the possibility of the alteration of the character of the tissue by decalcification.

ENAMEL SPINDLES OF VON EBNER.

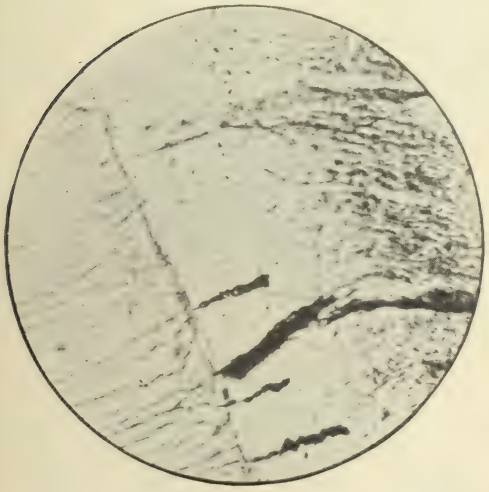
On examining a section thus prepared, your attention will first be drawn to the pronounced way in which the enamel spindles of Von Ebner are stained. (See Figs. 1 and 2.) We find these spindles are always stained in the same manner as the tubuli of the dentin; and the staining shows that there is a connection between the tubuli of the dentin and these spaces in the enamel. The staining also proves that the contents of these spaces are uncalcified (as the calcified tissue does not take the stain) and probably protoplasmic in character. On examining the next figure we shall see that there is direct communication with the pulp, through the tubuli, into these spaces. (See Fig. 3.)

The constant and regular occurrence of these cavities shows that they are not pathological, as has been suggested by Chas. Tomes, but normal, and probably play an important part in the life of the enamel. These spindles vary much in size, shape, and number; but in every case I think their existence is due to a check in the calcification of the cells forming the enamel, during the development of that tissue. These cavities (the enamel spindles) are certainly not produced by the shriveling up of the cement substance between the prisms, as suggested by Von Ebner, neither are his views correct when he suggests that they contain air, except in those teeth that have been allowed to become dry after extraction, and are cut and mounted in this condition.

In the soft tissue forming the contents of these spindles, there may at times be seen one or more small glistening bodies; they are hard and unstainable, and are not to be found in every spindle. To these bodies the name of Römer's corpuscles has been given (see Fig. 4) when they exist in the spindles. They are, I believe, composed of minute particles of calcified enamel, surrounded by the uncalcified tissue of the spindles.

It is very unusual to find any pronounced cavities corresponding to these

Fig. 3.



Showing direct communication through the tubuli. (Magnified 200 diameters.)

Fig. 4.

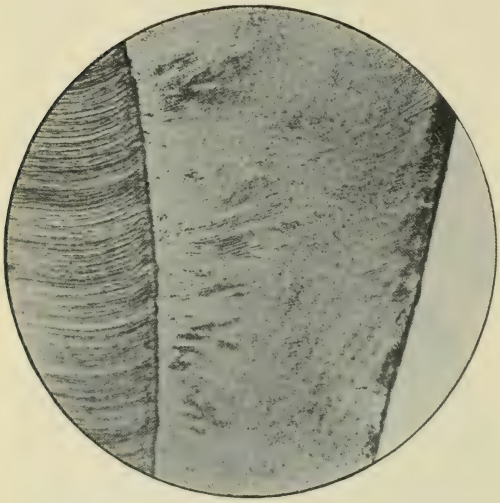


Section showing Römer's corpuscles in the enamel spindles.

enamel spindles in the teeth of animals, though in some of the figures from the teeth of animals I have found a modification of the enamel spindles. At the same time, both in the teeth of man and animals, there is to be found a very perfect means of communication between the pulp and the enamel by means of a series of tubes, or tube-like processes, distributed through the latter tissue. (See Fig. 5.)

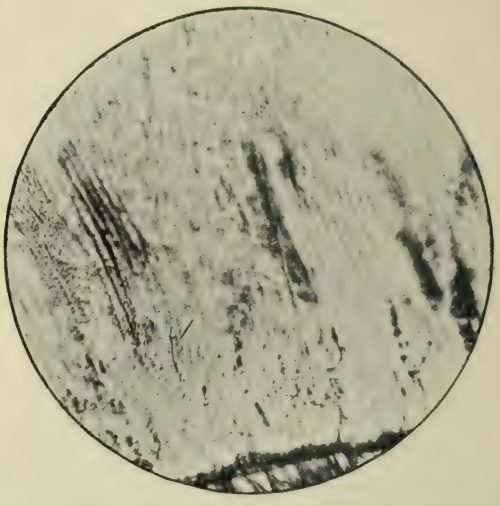
As these tubes exist in some form in all the teeth I have examined, we may surely consider them as normal, and not pathological; and finding no record of their existence in this tissue, I shall for the purpose of describing them call these spaces enamel tubes. Their position in

FIG. 5.



Section of human tooth near the neck, with tubes in the enamel.

FIG. 6.



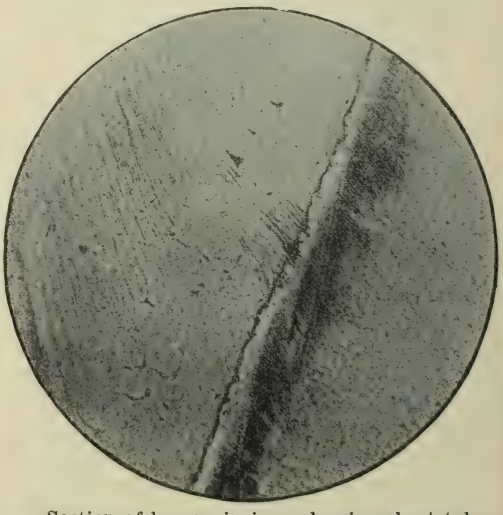
Portion of the previous figure. (Magnified 200 diameters.)

FIG. 7.



Also a portion of Fig. 5. (Magnified 300 diameters.)

FIG. 8.



Section of human incisor, showing short tubes.

the enamel tissue is between the prisms. They have no sheath such as is found in the tubuli of the dentin, the calcified enamel prisms. (See Figs. 6 and 7.)

These tubes vary much in size and

Fig. 9.



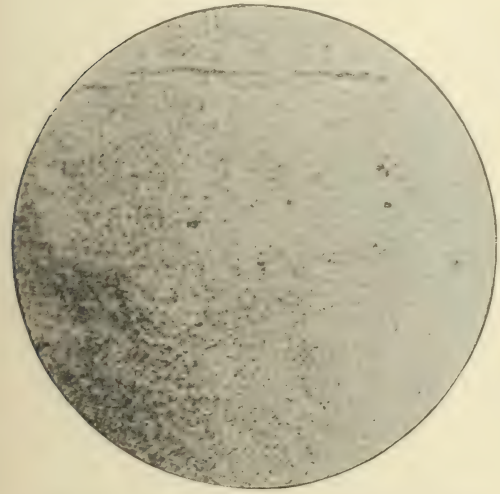
Section of incisor, showing tubes arranged in bundles. (Magnified 100 diameters.)

Fig. 10.



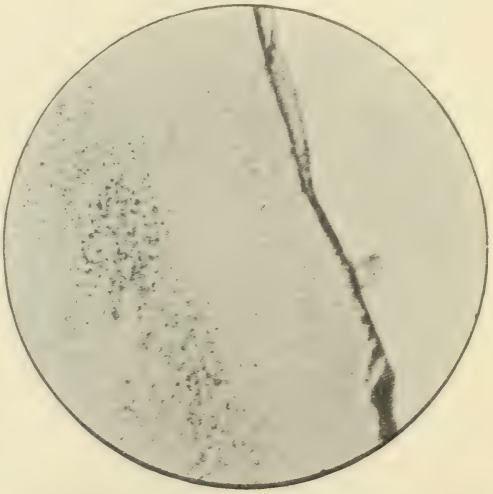
Showing bundles of tubes in tranverse section of human bicuspid. (Magnified 100 diameters.)

Fig. 11.



Cut ends of the enamel tubes. (Magnified 100 diameters.)

Fig. 12.



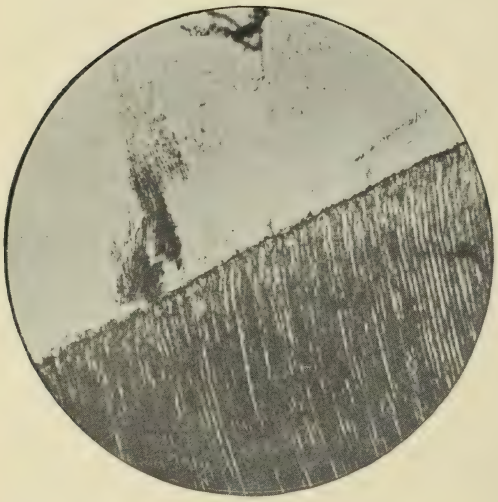
Cut ends of the enamel tubes. (Magnified 150 diameters.)

enamel prisms forming their walls, or sheaths. The contents of these tubes are composed of uncalcified tissue, and are probably produced by non-calcification of the tissue (cement substance or otherwise) that exists between the calength, according to their position in the tooth; thus, near the neck they appear as short, separate tubes. (See Fig. 8.) But as we approach the apex of the tooth these tubes are frequently found grouped together in bundles. (See Fig. 9.)

These tubes also take this form in the crowns of the bicuspids and molars. (See Fig. 10.) The bundles of these tubes frequently assume the form of a spiral, with the upper portion branching into two or more divisions, or they may radiate from their base and spread out like a fan. In either case it is almost impossible to get the whole of the bundle into focus under the microscope at the same time.

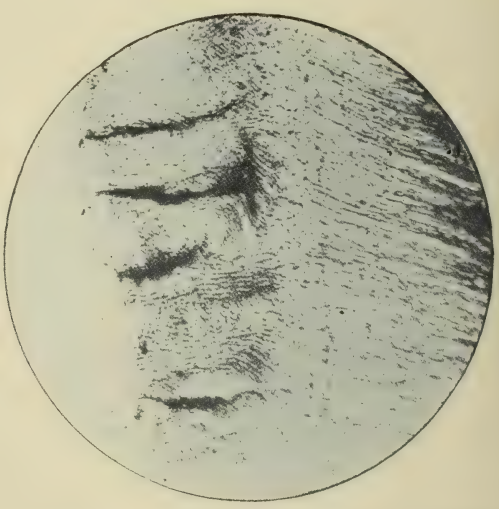
To prove the connection between the pulp and these tubes is an easy matter, owing to the ready manner in which they take the stain. (In the figures the dark portion in the enamel corresponds to the stained portion of the microscopic slide.) That these tubes are distinct

Fig. 13.



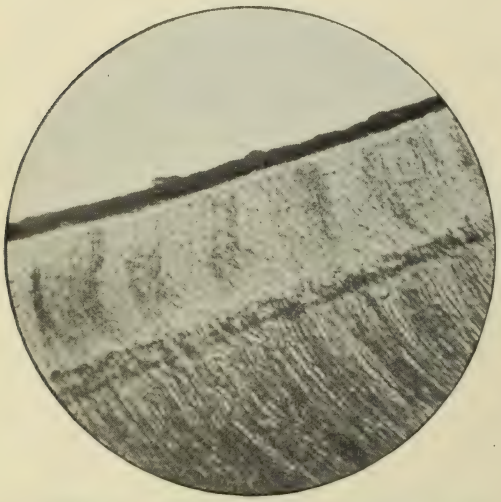
Section of incisor of gorilla, showing bundles of enamel tubes.

Fig. 14.



Section of canine of fox, showing straight tubes and tubes crossing each other.

Fig. 15.



Section of tooth of dog, showing tubes in the enamel.

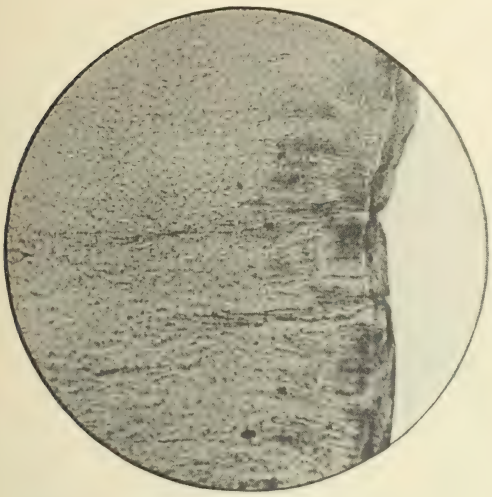
Fig. 16.



Section of upper incisor of cow, with tubes in the enamel.

spaces in the enamel, and consist of uncalcified tissue, is proved by the staining, and from the fact that wherever

Fig. 17.



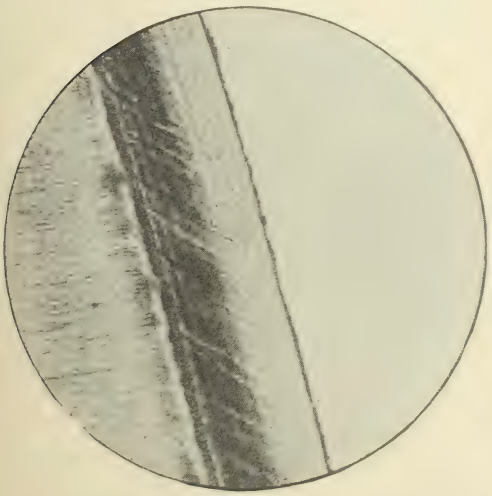
Section of tooth of pig, showing tubes in the outer portion of the enamel.

Fig. 18.



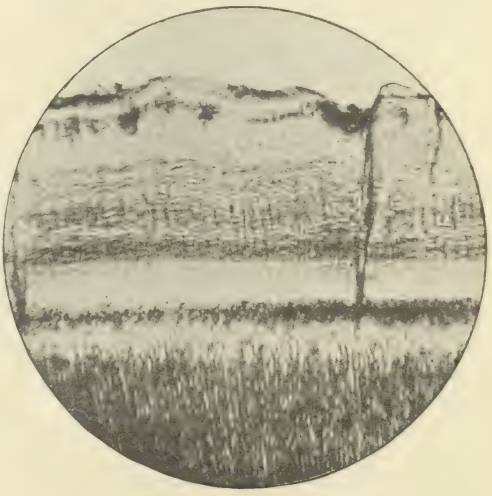
Transverse section of incisor of horse, with enamel showing tubes. The enamel is between the dentin and the cementum.

Fig. 19.



Section of incisor, showing enamel tubes in the tooth of rat.

Fig. 20.



Section of tooth of alligator, with tubes in two directions.

there are cut ends of these tubes the ends are always stained in the same manner as the cut ends of the tubuli of the dentin. (See Figs. 11 and 12.)

The tubes in some form are contained in the teeth of the following animals: In the *primates* we have examined the teeth of man and the gorilla (see Fig. 13). In the *carnivora* we find them in the fox (see Fig. 14); in the dog (see Fig. 15). In the *ungulata* we find them in the cow (see Fig. 16), in the pig (see Fig. 17), and in the horse (see Fig. 18). In the *rodents* we have these tubes in the teeth of the rat (see Fig. 19);

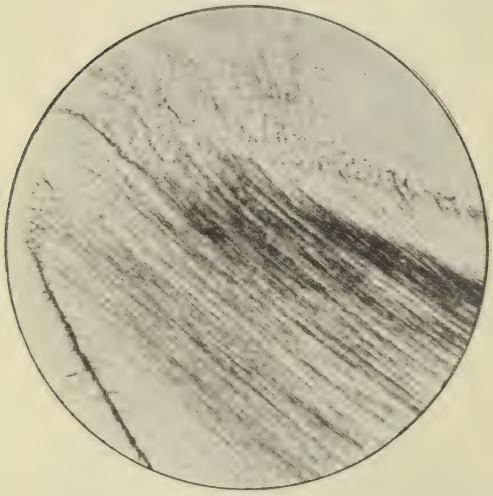
whilst from the tooth of the alligator we have a most interesting illustration, for in this case the tubes not only pass from the dentin toward the outer surface of the enamel, but are to be found in bands surrounding the dentin. (See Fig. 20.)

That we may better understand the way in which the stain passes into the tubes in the enamel from the pulp, I will for a short time draw your attention to the point of connection between the two tissues, the enamel and the dentin. In most cases immediately under the enamel the tubuli of the dentin branch very much, frequently anastomosing, and forming a complete network of small tubes along the edge of the dentin at the enamel margin. (See Fig. 21.) This network of the tubuli is an early stage of a granular layer, as found in the teeth of some animals we have examined. If we now take a section from the tooth of the pig, we find that the branching is more pronounced, and that a rudimentary granular layer is to be seen under the enamel. To advance a stage further, I shall draw your attention to the teeth of the fox; in these teeth we have a granular layer well developed under the enamel. (See Fig. 22.)

In passing to the next, and last, figure illustrating the development of the granular layer under the enamel, I shall draw your attention to a section of a tooth of a cow, as in this animal we have a perfect granular layer in the teeth corresponding to the granular layer between the dentin and the cementum, and continuous with it. (See Fig. 23.) The tubuli of the dentin terminate in this layer on the one side, and the enamel tubes usually pass into it from the other side, thus making the ends of the tubuli, and the granular layer where it exists, the means of communication between the two tissues.

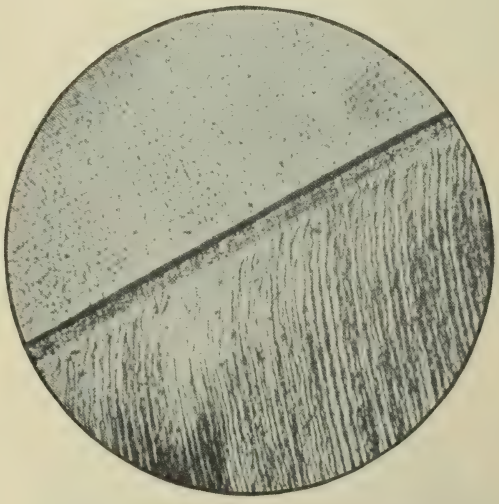
There is also to be found in the enamel, besides the spindles and tubes, a more or less complete network of uncalcified tissue passing between the prisms, and taking the stain readily. (See Figs. 24 and 25.) This network of uncalcified tissue continues through the enamel until we reach the outer portion of this tissue, when we find a series of larger tubes passing from the outside toward the central portion of the enamel tissue.

Fig. 21.



Section of human incisor, showing connection between the tubuli of the dentin and the tubes in the enamel.

Fig. 22.



Section of tooth of fox, showing branching of the tubuli, granular layer under the enamel, a layer of deeply-stained uncalcified tissue between the enamel and the dentin, and cut ends of tubes in the enamel.

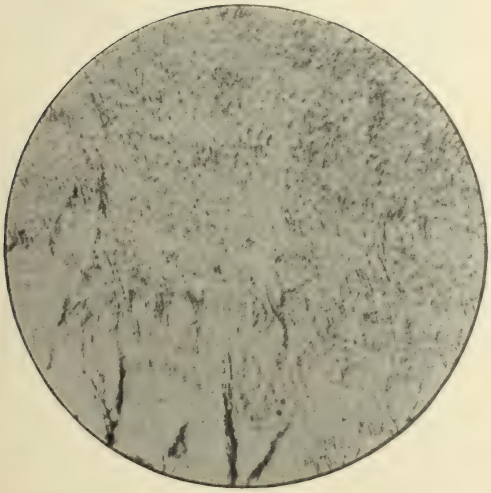
Before referring to these tubes in the outer portion of the enamel, I should like to draw your attention to this method of staining for the purpose of following the curvature of the enamel prisms, by presenting a section of an upper bicuspid, showing the curvature of the prisms and the way in which they cross each other. (Fig. 26.) In the incisors and canines this curvature of the prisms is not very pronounced, except at or near the cutting edge of the teeth;

FIG. 23.



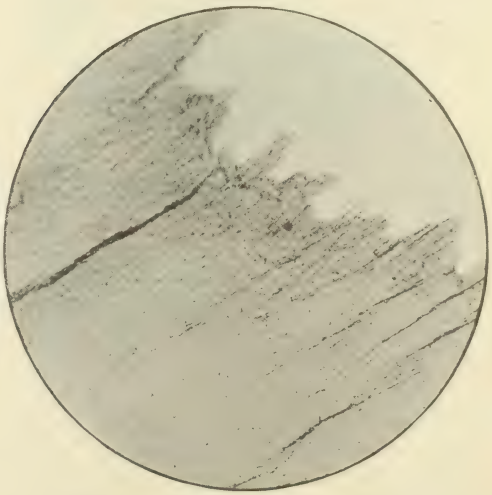
Section of tooth of a cow, showing granular layer and enamel tubes.

FIG. 24.



Section of a molar, with a portion of the enamel broken away after the section was ground down to show the line of fracture and the stained tissue between the prisms.

FIG. 25.



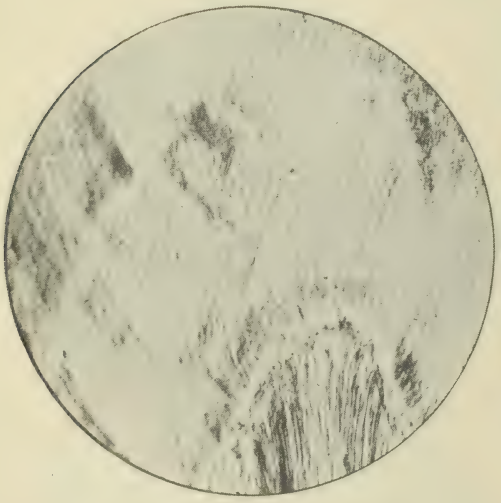
A similar section to that illustrated in Fig. 24, but unbroken, showing the stained tissue between the prisms.

but in the bicuspids and molars the reverse is the case, for in these teeth the curvature is most pronounced; and I believe there is a very useful purpose for this curvature. We all know the ease with which the enamel can be cut along the line of fracture at or near the neck of the tooth, where the prisms are straight; but try to do the same on the crown of a bicuspid or molar and you will find that the resistance is very great. The cause of the resistance is the curvature of the prisms, and the reason of this curvature is that the teeth may overcome the strain put upon them during the process of mastication.

We will now return to the enamel tubes that appear on the outer portion of the tissue and pass inward. (See Fig. 27.) This figure shows that these tubes are larger than those in the center of the enamel, and that they are regular in arrangement and frequently grouped together. In some animals, especially in the cow, amongst these tubes are frequently to be found bundles of tubes similar to the bundles found on the margin of the enamel near the dentin. (See Fig. 28.)

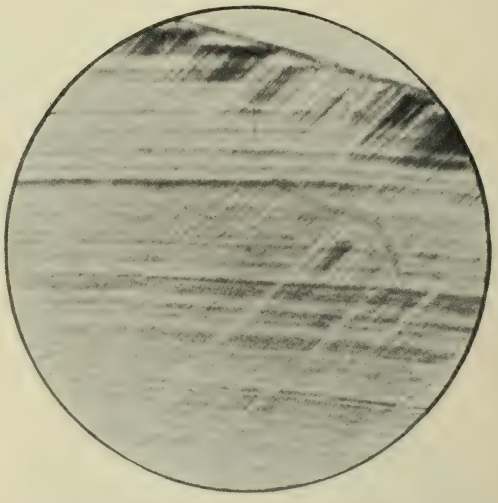
I said in the earlier portion of my paper that these spindles and enamel tubes play a very important part in the life of the enamel. The following are, I believe, some of the functions of the uncalcified tissue of the enamel: (1) To convey sensation from the outside of the enamel to the pulp, especially in cases of erosion and sensitive enamel. (2) To allow for any expansion or contraction that may take place in the enamel. (3) As a means of conveying nourishment to the enamel during the life of the pulp. I am convinced the enamel is a live tissue as long as the pulp is alive, and, as a consequence, there is no change in the color of the enamel until the enamel dies with the death of the pulp.

FIG. 26.



Section of upper bicuspid, showing the curvature of the prisms and the way in which they cross each other.

FIG. 27.



Section of human tooth, showing the outer edge of the enamel, with tubes passing toward the center of the tissue.

There are still two portions of this tissue to which I desire to draw your attention: (1) The brown striæ of Retzius; and (2) Schreger's lines.

THE BROWN STRIÆ.

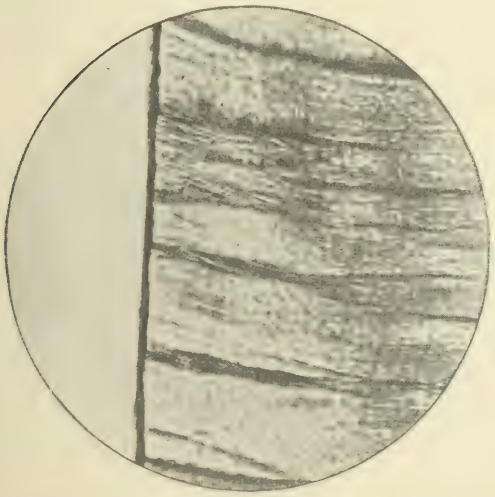
There has been much discussion as to the cause of these markings. A. Hopewell-Smith says that "These stratifications are only visible in vertical sections." In this he is not correct, as I

shall give illustrations both longitudinal and transverse, in which they appear. He also says, "The striæ of Retzius are due to pigmentary deposit in the prisms. The theories propounded by Von Ebner and Kölliker have been dismissed by Leon Williams as incorrect. The former observer supposes that the bands are due to imprisoned air or gas which has entered the ground-off ends of the rods through minute channels, and to this Leon Williams replies that the idea is a mistaken one: first, because the supposed canals have no existence; secondly, because the ground-off ends of the enamel prisms do not appear except when the sections of enamel are ground off at a certain angle."

We will now see how the theories of Leon Williams agree with what the illustrations show us. First, we will examine the theory of pigmentation producing the brown striæ. (See Fig. 29.) The first thing you will notice is the absence of anything approaching to pigmentation in the prisms; each prism in this portion of the enamel is free from pigmentation, as are the prisms in any other portion of this tissue. Secondly, between each prism there is a stained portion in the form of a short canal, about the same width as the prism. Thirdly, passing inward toward the center of the enamel is a series of the cut ends of these canals, in the form of a number of dots. I think this figure will convince anyone that the views of Leon Williams are not in accord with what is shown by this method of staining. If we now examine a transverse section of a tooth (see Fig. 30), we find the same structure, minus the cut ends of the prisms; and in the next illustration (see Fig. 31), showing a longitudinal section, the enamel is thinner than in Fig. 29, and as a consequence shows the structure better. We have here the same structures as in the previous illustrations.

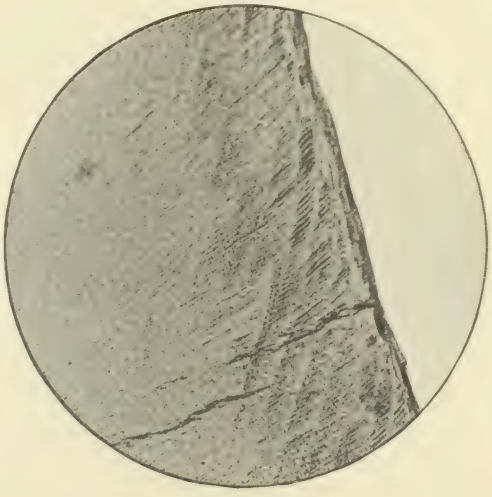
Having shown that there is no pigmentation in the prisms, and that there is what Von Ebner may well call canals, also that it is possible to see both the canals and the cut ends of some of them in the same illustration, we find there is nothing to confirm Leon Williams' theory of pigmentation, whilst Von Ebner having probably made his examination upon dry teeth, we can easily understand how he made the slight mistake, if we may call it such.

Fig. 28.



Section from the incisor of the cow, showing bundles of enamel tubes. (Owing to the curved form of these bundles it is impossible to get the whole in focus at the same time.)

Fig. 29.



Longitudinal section of human tooth, showing brown striæ.

After having examined a large number of these sections I am convinced that the brown striæ are produced by the difference in the refractive index of the prisms and the large number of enamel tubes that exist in this brown striæ. These tubes take the stain well. They are usually larger, more regular, and more pronounced than in any other portion of the enamel, except when these tubes form bundles on the margin of the dentin.

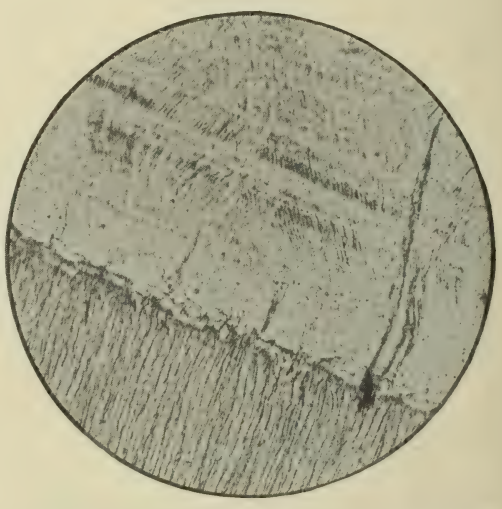
In some sections the prisms between the tubes appear slightly pigmented.

Fig. 30.



Transverse section of enamel through brown striæ.

Fig. 31.



Showing longitudinal section of enamel through brown striæ.

This is due to the thickness of the section, and is produced as follows: When a section consists of more than one layer of enamel prisms the tubes in each individual layer are not directly under each other, and, as a consequence, the light has to pass through the canals before it reaches the prisms. In this case the result of the difference of the refractive index of the different portions of the tissue is to produce the appearance of pigmentation in the prisms. To prove this, grind the section thinner, and the appearance of pigmentation disappears.

These brown striæ are not confined to human teeth but are to be found in the teeth of many of the animals examined.

THE LINES OF SCHREGER.

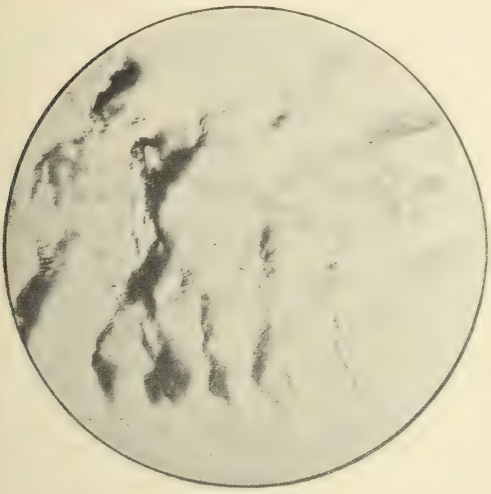
Though the cause of these markings is the same as that which produces the brown striæ (the increase in the tubes between the prisms, and the difference of the refractive index), the effect produced is very different in appearance. In the lines of Schreger we have a beautiful cloud-like effect, produced by the curvature of both the prisms and the canals. On carefully examining the illustration you will see the tubes are quite distinct where they are in focus, and by altering the focus when examining the slide under the microscope the curvature can be easily followed. (See Fig. 32.)

Doubts have been raised by some as to the correctness of the theories expressed in this paper, as they do not agree with the analysis of enamel as recorded by Chas. Tomes, who states that there is no uncalcified tissue in the enamel; but, as I have already stated, of all the analyses published no two agree, hence the difficulty of accepting any one as reliable.

In this difficulty I consulted my friend

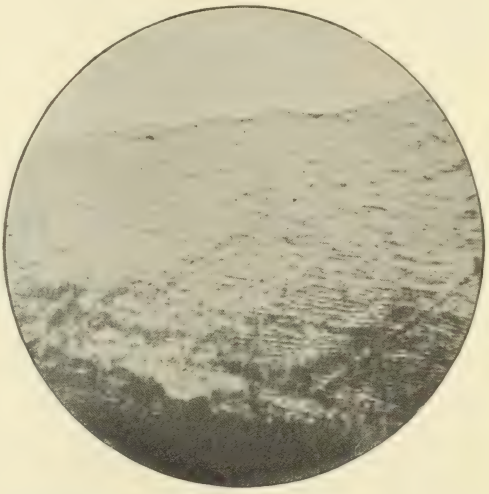
E. H. Farr, F.C.S., and he suggested the following chemico-microscopical test, which he has kindly carried out for me: Take a section of enamel that has been ground very thin; carefully remove all the dentin from the section, and then place the section in fused borax and thoroughly heat the enamel, so that if there be any uncalcified tissue it may become carbonized. Now carefully dissolve out the borax, and if there be any uncalcified tissue it should show dark brown or black when the section is mounted for microscopical examination. The last illustration (Fig. 33), showing a section of carbonized enamel, illustrates well the uncalcified tissue, corresponding to the stained tissue of the enamel.

Fig. 32.



Showing Schreger's lines. (Magnified 100 diameters.)

Fig. 33.



Section of carbonized enamel, showing uncalcified tissue.

SOME DEGENERATIONS AND THEIR SIGNIFICANCE. (II) PAGET'S DISEASE OF THE ORAL MUCOUS MEMBRANE.

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INTRODUCTION.

POSSESSING no ordinary degree of practical utility, or of interest, for the modern dental surgeon as does a study of the degenerative conditions which may affect the root membrane of the teeth of man—one of which formed the subject of the preceding paper in the DENTAL COSMOS for April last—it will doubtless be readily conceded that a disease which must engage the attention of the dermatologist and oral surgeon, as well as of the general reader of this journal, is of necessity, and by virtue of its larger bearing on surgery and on the principles of life and death, far profounder in its importance and vaster in its clinical and pathological significance. Such an one is that rare type of degeneration about to be described.

The former—fibroid degeneration of the periodontal membrane—having a mesoblastic derivation, is a local manifestation of a benign condition which, *per se*, remains always benign; the latter, epiblastic in origin, a local manifestation of a benign condition which, as will be presently seen, may become malignant: the first a product and an accompaniment of senility; the second, of youth or middle age; the one a common termination of a common affection, the other an unusual termination of a constantly-occurring neoplasm. A similar type of degeneration, it is perfectly safe to say, has hitherto never been described as affecting the mouth and its contents.

Sir James Paget,[1] who first drew attention in the St. Bartholomew's Hospital reports for 1874 to cases of a certain disease of the mammary areolæ, has been followed by many other contributors to our knowledge of the subject, among whom may be mentioned Butlin,[2] Wickham,[6] Darier,[4] Duhring,[3] Wile,[5] etc. It has, however, only recently been found that the genitalia may, at times, undergo similar morbid changes, histories having been put on record by Pick, Rolleston,[7] Dubreuilh,[9] Ravogli,[8] and others, including Fordyce, in 1903, at the New York Dermatological Society; while Calcott Fox and MacLeod[10] have reported one instance of Paget's disease of the umbilicus.

The definition of "malignant papillary dermatitis" has been applied to this affection; and it constitutes, in the words of MacLeod ("A Practical Handbook of the Pathology of the Skin," 1903), "a peculiar type of persistent dermatitis which clinically in its early stages somewhat resembles chronic eczema. . . . . In later stages of the disease its malignant character becomes evident, and a carcinoma develops." The present writer has been fortunate enough to obtain a specimen as it occurs in connection with the oral mucous membrane—the first, he believes, which has ever been recorded and photographed.

MORBID ANATOMY.

In the summer of 1903 the writer received from Mr. Cecil Robinson, L.D.S.Eng., resident at Newquay, Cornwall, a specimen which at first excited but little attention. A diagnosis of "epulis"—an incorrect and unscientific term as commonly employed at the present day, one which, as the author has repeatedly affirmed, ought to be deleted

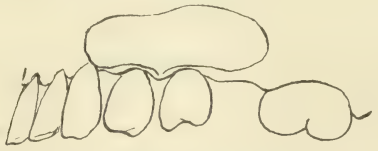
from all dental nomenclature—had been made, and the newgrowth removed. With the object of forwarding it to the author for histological examination and possibly confirmation of the diagnosis, it was placed at once in a solution of alcohol.

This fact is of prime importance, for two reasons: Generally speaking, alcohol decolorizes animal tissues very rapidly, and fibromata as well as other more or less vascular growths after a short immersion in this reagent soon assume a pale appearance. The tumor under notice did not become affected in this way by its saturation in the hardening fluid; and the knowledge and recognition of this places, many minute gum-like papillæ, while here and there, especially on its exposed convexity, extended several large and small deep-red irregularly shaped areas bearing a marked resemblance to dried blood-clot. They were not, however, flat masses of coagulum, but thin patches of a kerato-hyalin material of which a description will be given later.

CLINICAL HISTORY.

The patient was a lady aged twenty-five, who had noticed the growth for a period of three years. It was lying in the lower right bucco-alveolar sulcus,

FIG. 1.



Outline drawing showing shape, position, and relative size of the periosteal fibroma of the jaw. (Actual size.) From a pencil sketch by Mr. Cecil Robinson.

should act as a warning in the future, and put the observer on his guard to suspect the possibility of the occurrence of malignancy of the presence of abnormal or degenerative changes in the tissues which comprise its bulk.

Again, the use of alcohol and not proper fixatives like Fleming's solution or Rabl or Fol's formulæ, prevented the ultimately perfect display in the epithelial cells of the various stages of karyokinesis which were present in many parts. In spite of this precaution, nevertheless mitotic figures were exceedingly abundant. On naked-eye examination a firm, solid, reniform, pedunculated tumor of a deep blood-red color was revealed. Its measurements were as follows: Breadth fourteen millimeters, extreme length twenty-three millimeters, greatest circumference thirty-five centimeters. These measurements, with the illustration (Fig. 1) are merely intended to convey to the reader some idea of its size and shape.

Its surface was smooth, and showed, in in the second molar region between the first premolar and the second molar (see Fig. 1), and presented as a painless movable tumor the growth of which had been "extremely slow." There was no facial disfigurement, and the patient only complained of some inconvenience arising from its position, and a slight superficial hemorrhage from its surface after the use of the tooth-brush.

Careful inquiries resulted in obtaining the details that there was no visible or obvious source of irritation, nor had medicinal or caustic treatment been adopted. The neighboring teeth were carious, but apparently unaffected by pyorrhea alveolaris, which might reasonably have been supposed to be a factor in its etiology; and there was no family history of malignant disease. Some slight signs of mottling of the surface were noticed, and the pedicle of the growth was found to be firmly attached to the gum margin exactly over the septum of bone separating the first and second premolars.

TECHNICS OF MICROSCOPICAL RESEARCH.

A transverse median segment having been excised and embedded in gum mucilage, a few sections were obtained by freezing on a Williams' ether microtome and stained with Ehrlich's acid hematoxylin. A preliminary glance showed that the growth was a fibroma of the hard variety in which a degenerated or abnormal condition of the superficial epithelial cells was a curious and conspicuous characteristic. Thus was corroborated the diagnosis of a fibrous innocent periosteal tumor; but, in addition and most significantly, that this common benign growth was undergoing—and had been undergoing for some time—a cancerous type of degeneration.

Attracted by the unusual features of the cytological changes in the epithelial covering of the tumor, the writer found it necessary to use varying stains to ascertain the exact histological, pathological, and chemical nature of the variations that had been induced. A portion of the excised tissue was therefore embedded in paraffin wax, and sections were stained with hematoxylin and eosin, polychrome methylene blue, and also by Van Gieson's method.[11]

The last-named is used for differentiating kerato-hyalin from mere hyalin substances, and comprises the following process: Alcohol-hardened tissue is cut on a microtome, and then sections are (*a*) stained for half an hour in Delafield's hematoxylin; (*b*) then washed in water; and (*c*) stained from three to four minutes in the following mixture: To a saturated aqueous solution of picric acid is added a sufficiency of a saturated aqueous solution of acid fuchsin to give the mixture a deep color. The final steps consist in (*d*) washing in water; (*e*) differentiating and dehydrating in alcohol; (*f*) clearing in oil of bergamot and mounting in balsam. By this treatment the kerato-hyalin granules are stained a dark brown, hyalin alone an orange color. Kerato-hyalin, it may be mentioned, is not a fatty substance, nor analogous to glycogen; but it is digestible in pepsin and soluble in strong acids.

Here then, therefore, was a remarkable example—to express it plainly—of an innocent growth of the jaws becoming distinctly malignant—a fibroma undergoing epitheliomatous retrogressive metamorphoses. What were these changes? How were they occasioned? What deductions can be drawn from the case? what was its signification?

PATHO-HISTOLOGY.

It will be convenient, in the first place, in detailing the minute anatomical appearances, which to the histologist cannot fail to be of the greatest interest, to use the somewhat arbitrary, artificial divisions adopted by microscopists of the present day,[12] as applied to the epidermal covering of the skin and certain mucous membranes of the body. The patho-histology may therefore be considered under the headings of—

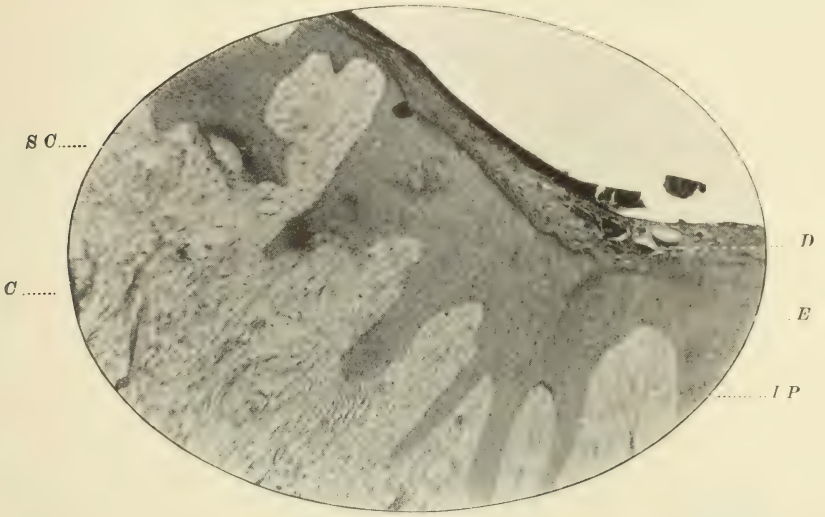
(A) Changes in the stratum corneum including the stratum lucidum and the stratum granulosum;

(B) Changes in the stratum mucosum;

(C) Changes in the sub-epithelial tissue or the cutis vera.

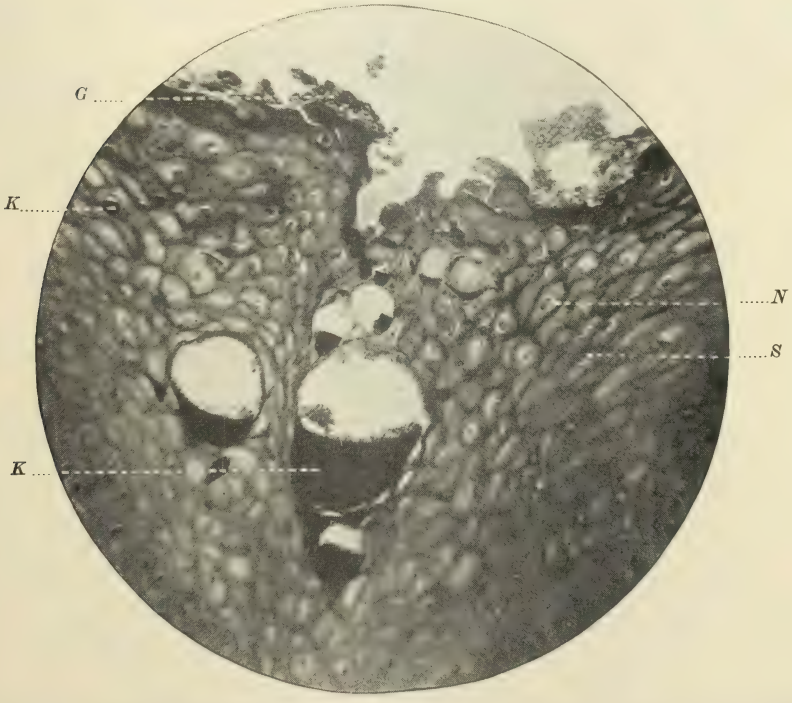
(A) The *stratum corneum* extends over four-fifths of the periphery of the growth; where deficient, there is no differentiation of squamous stratified and columnar cells. But this layer presents many departures from the normal type. In some places it and the contiguous strata are insensibly merged into one another; in others, the former is sharply defined (Fig. 2), and then shows as an unusually thin band of flat, narrow, stratified corneous cells with elongated planary nuclei whose chromoplasm is indistinguishable and structureless. There is a marked tendency, here and there, toward desquamation; and the free surface is partially covered with layers of keratin or kerato-hyalin material which presents either as a mass of tiny granules (Fig. 3) or a denser more homogeneous partially detached ground-glass-like matrix. (Fig. 4.) Polychrome methylene blue rendered the contents of these cells and those of the stratum granulosum very prominent, and accentuated by

FIG. 2.



Degenerated epithelium on surface of fibroma: stained with polychrome methylene blue and eosin. (Magnified 60 diameters.) *S C*, Line of demarkation between superficial strata and stratum mucosum. *D*, Ballooned cells containing kerato-hyalin. *E*, Epithelial cells of a less degenerate type. *C*, Connective tissue fibers and cells comprising the substance of the fibroma. *I P*, Normal character of interpapillary process of dermis.

FIG. 3.



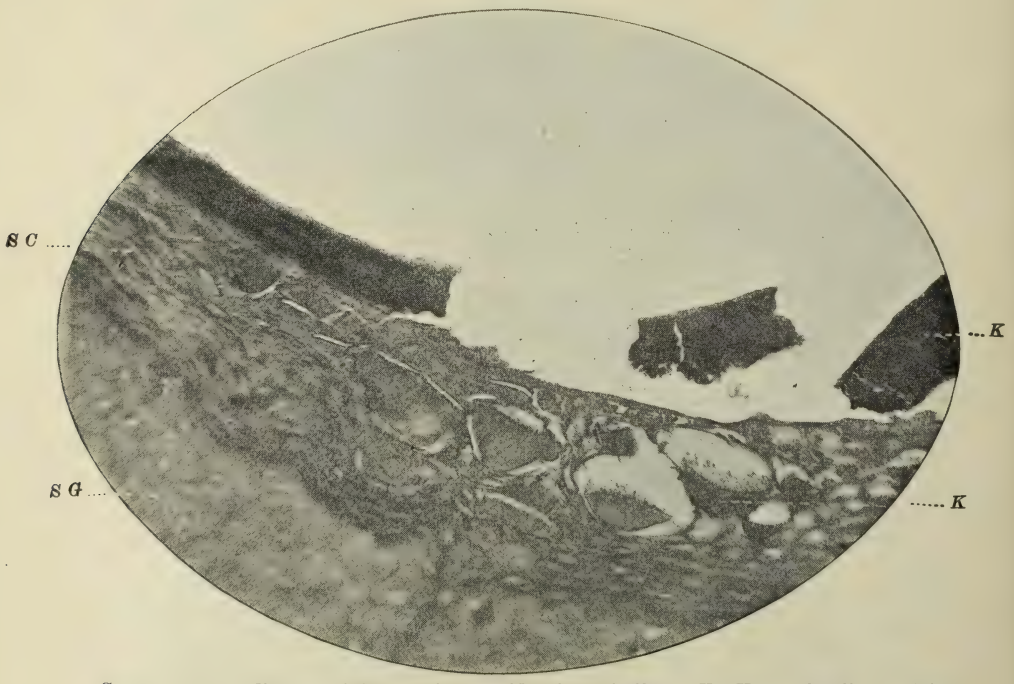
To show minuter details of epithelium stained as in preceding. (Magnified 240 diameters.) *K*, Meniscus of kerato-hyalin material. *G*, Granular type of kerato-hyalin material on free surface. *N*, Nucleus lying in a clear space. *S*, Inter-epithelial space devoid of "prickles."

means of its chemical affinities the presence in places of flakes of eleiden (Ranvier) or kerato-hyalin. Fig. 5 shows that in places these superficial layers penetrate almost to the corium of the fibroma.

Particularly striking are irregularly arranged patches of these degenerated cells; they appeared in every section. The cell wall had apparently become grossly distended (ballooning) by retrogressive but at others partially filled with granular detritus. (Fig. 3.) These patches extend some distance toward the center of the fibroma (Figs. 7 and 8); and the epidermal cells were simultaneously proliferating inward.

(B) A little lower down, and nearer to the rete mucosum or Malpighii, the cells are more normal in shape and size. The greater number are "prickle" cells; but many have no intercellular bridges and

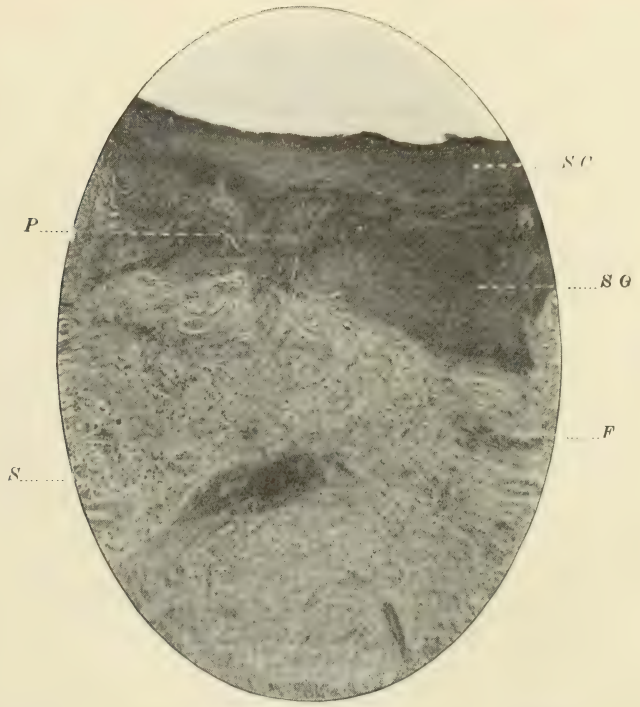
FIG. 4.



Same as preceding, staining and magnification similar. *K*, Kerato-hyalin matrix. *S C*, Superficial degenerated stratum of cells. *S G*, Stratum mucosum (degenerated).

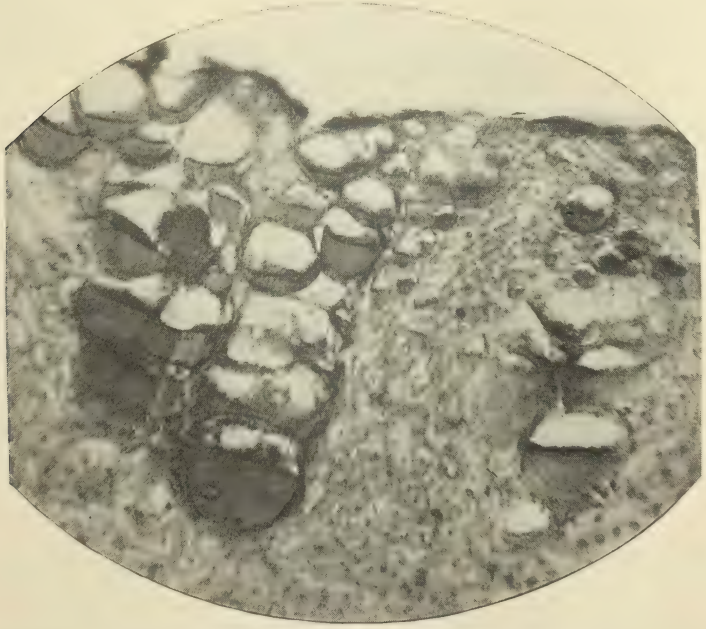
changes occurring within it (Figs. 3 and 6). The nuclei in many cases are absolutely destroyed; the spongioplasm had disappeared, and the hyaloplasm, which in normal young cells constitutes the greater relative amount of the protoplasm, had evidently become converted into masses of keratinized material which in vertical sections of the epithelium often filled the whole of the ballooned cell and often produced a meniscus-like body, the open space of which was invariably situated at the peripheral portion of the cell, and sometimes was empty are not separated by inter-epithelial channels. The majority of the "prickle" cells exhibit their nuclei lying in a clear, narrow space. (Fig. 3.) Perhaps the greatest interest centers in these nuclei. All changes and rearrangements in their karyoplasm can be noticed. The majority show them in a "resting" stage, but the chromosomes while large in size seem very few in number—a condition known as hypo-chromatosis.[13] On the other hand, many of the changes due to the process of karyokinesis are observed and the mitotic figures prettily exhibited in

FIG. 5.



Surface of fibroma: stained with hematoxylin and eosin. (Magnified 50 diameters.) *S C*, Superficial strata of a fairly normal character. *S G*, Stratum mucosum with edematous epithelium. *P*, Epithelial cells proliferating inward, and breaking through the normal basement membrane. *F*, Connective tissue of fibroma. *S*, Small round-celled infiltration.

FIG. 6.



Large patches of ballooned epithelium in degenerated edematous tissue; stained with hematoxylin. (Magnified 250 diameters.)

FIG. 7.



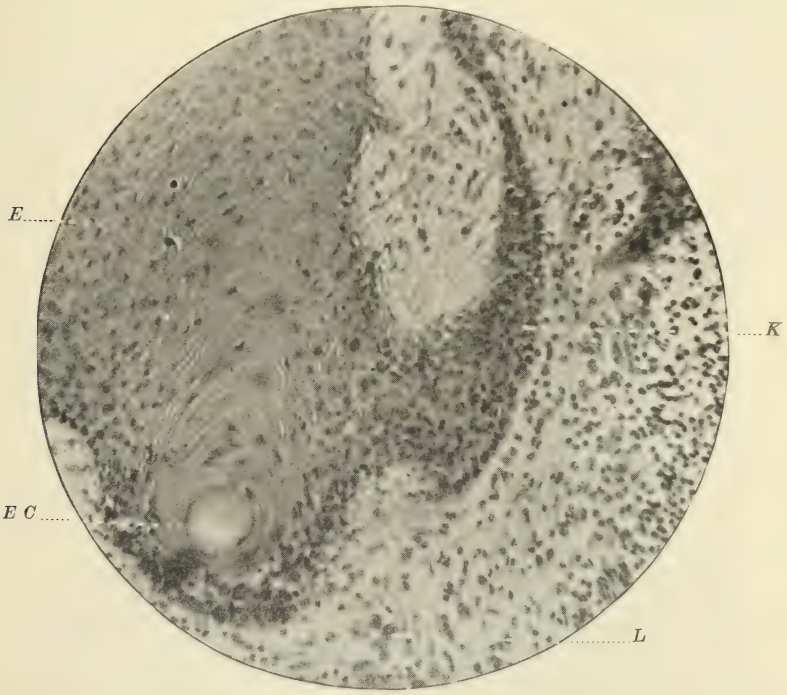
Another degenerated patch showing its superficial position; stained with hematoxylin. (Magnified 45 diameters.) *D*, Cluster of ballooned cells. *E*, Irregular outline of basal layer of epithelium.

FIG. 8.



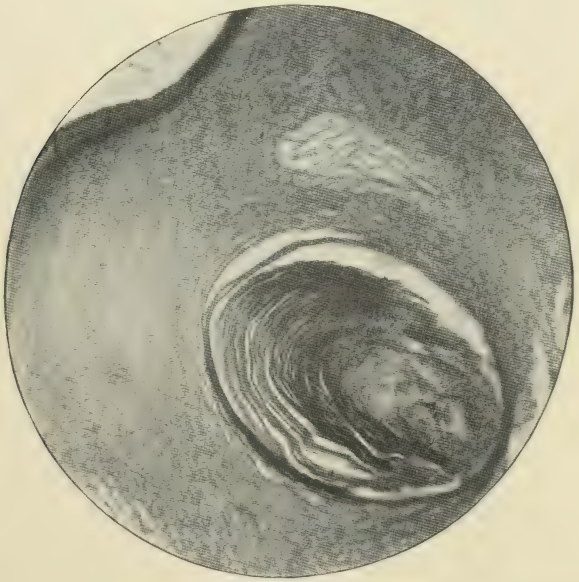
Similar to preceding, but exhibiting the various stages in the process of formation of the ballooning of the cells: stained with hematoxylin and eosin. (Magnified 50 diameters.) *D*, Cells of a fairly normal character, but passing, on the left, to the condition which is at its highest point of development at *K*. *E*, Epithelium of stratum mucosum.

FIG. 9.



Cell nest at base of epithelial column: stained as in Fig. 8. (Magnified 250 diameters.) *E*, Epithelium of stratum mucosum. *E C*, Cell nest showing corneous character of the central portion. *K*, Epithelial cells undergoing karyokinesis; nuclei displaying asymmetric mitoses. *L*, Polymorpho-nuclear leucocyte in small-celled infiltration.

FIG. 10.



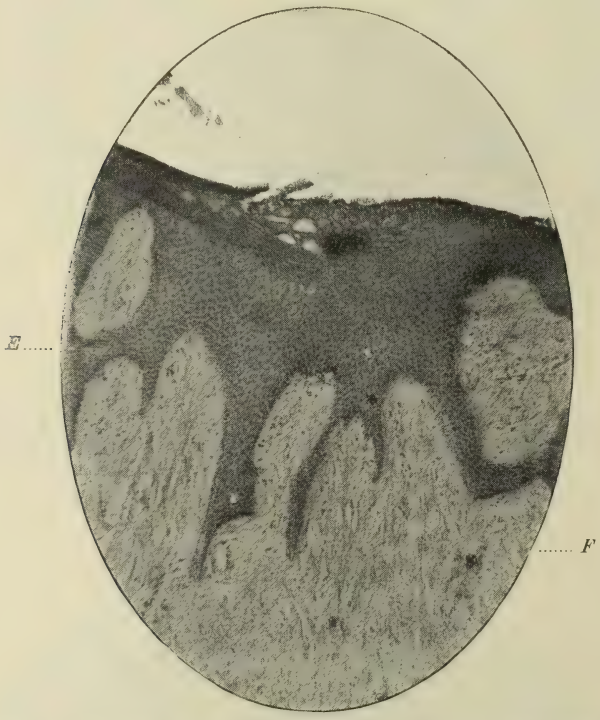
Another cell nest: stained with eosin. (Magnified 110 diameters.)

the hematoxylin-stained sections. Those treated by the Van Gieson method are not so brilliant.

Most of the changes familiar to the histologist and pathologist can be detected. Thus, typical heterotype amphiasters, ring chromosomes and centrosomes, and many instances of asymmetric mitoses occur. There are slight evidences of karyoclasis and karyolysis,[13] are unduly large, and form, as seen in Figs. 9 and 10, a striking feature of the sections.

The delicate basement membrane which supports the rete Malpighii is, generally speaking, extremely irregular in outline. (Figs. 11 and 12.) The columnar epithelial cells situated upon it appear to be fairly regular in shape, and to show few evidences of degeneration or edema.

FIG. 11.



Irregularity of epithelial surface: stained as in Fig. 8. (Magnified 45 diameters.)
E, Epithelium. *F*, Tissue of fibroma.

but no vacuolation of the nuclei, though the cells themselves are certainly, generally speaking, undergoing hydropic degeneration.[14] Darier's "coccidia" and typical myeloid cells are also present, but not frequent—at least bodies resembling them appear to exist scattered about in places.

Equally important with the above metamorphoses are the presence of the typical cell-nests of the squamous carcinomata. A few are discerned near the deepest portion of the rete mucosum, and But the uniformity of outline of the basement membrane repeatedly and greatly departs from its usual foldings, and the interpapillary spaces are exceedingly irregular.

In that portion of the periphery of the growth where the strata corneum, lucidum, and granulosum are absent, the epithelial cells are all more or less edematous (Fig. 12), and, briefly, exhibit signs of a condition corresponding to eczema of the skin. They are swollen, rounded, greatly multiplied, and tend to

an anomalous degeneration, being absolutely devoid of intercellular bridges. As a result of the colliquative degeneration vesiculation has slightly occurred; and there are also many migratory cells, etc.

(C) Changes in the cutis vera. Here the papillæ are seen to be, in parts of the fibroma, very irregular, as already indicated. A noticeable condition is, however, the small round-celled infiltration

FIG. 12.

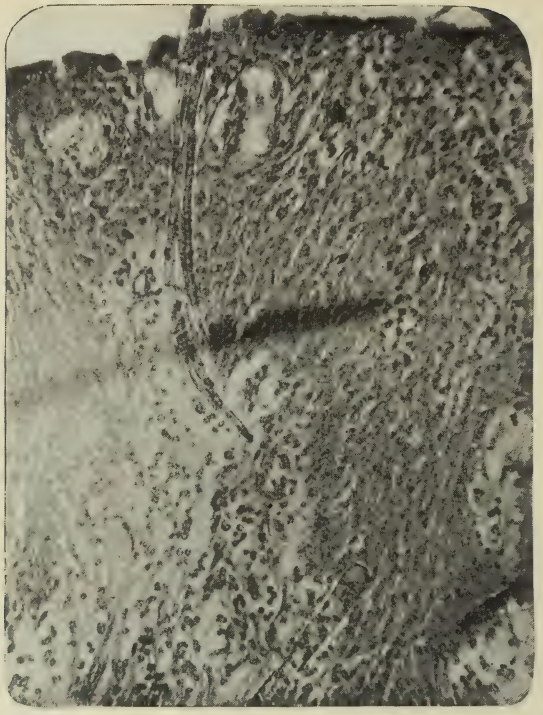


Surface of fibroma at junction of eczema-like epithelium, with the epithelial layers of preceding sections: stained and magnified as in Fig. 11. *S*, Epithelium similar to that in preceding figure. *E*, Edematous cells with no superficial strata, and extending in irregular columnar formation into the substance of the fibroma. The rapidly growing epithelium and the round-celled infiltration of the sub-epithelial tissue are shown.

Their depth from the surface does not modify these changes (Fig. 13). The process of karyokinesis is with difficulty made out in these situations, though there is no doubt that it is taking place, and that some proliferation and growth of the epidermis accompanies it.

which has been associated with the cytological metamorphoses. In the neighborhood of the cell nests, in the most irregularly shaped interpapillary processes, and beneath the edematous surface this infiltration is most marked. The cells themselves are largely of the Unna's

FIG. 13.



Details of eczematous epithelium of preceding figure, showing formation of vesicles.

FIG. 14.



Dense cell infiltration of dermal tissue at base of epithelial column: stained as in Fig. 8. (Magnified 210 diameters.) *E*, Stratum mucosum. *R*, Cellular infiltration in connective tissue framework of fibroma.

plasma-cell type, mixed with a few leucocytes (polymorpho-nuclear neutrophiles and lymphocytes) and some eosinophiles and connective tissue nuclei and the "mast cells" of Ehrlich. In addition there is an abundant blood supply.

ETIOLOGY.

Thus far this communication has dealt exclusively with facts. It is now permissible, necessary, and logically sequential that an inquiry should be instituted with regard to the theory concerned in the causation of the changes already described, and an endeavor made to bring them into line with those of modern research. It may, however, be stated at the outset that many difficulties beset this work. The recording of clinical histories and the describing of macroscopical and microscopical anatomy are accomplished with facility and some degree of certainty; not so when attempts at etiology are undertaken.

The exciting cause (or causes) of cancer has for generations perplexed the minds of men, and today in England there is probably no one department of medical science which has more strenuous followers, bacteriology and therapeutics not excepted. It would be germane to the scope and intention of this article if the various questions relative to it were discussed. It must be sufficient if allusion is very briefly made to the latest opinions of authoritative and competent witnesses, and these suggestions applied to the present case.

The clinical notes do not in any way account for the presumably sudden assumption on the part of an innocent tumor of malignancy.

Physical and chemical lesions seem to be at once eliminated as affording the least possible clue. There was no apparent source of irritation or traumatism as occurs unmistakably in mammary scirrhous carcinoma or labial epithelioma or "chimneysweep's" cancer, and the predisposing factor of age can also be put out of court. Sections were stained specially to discover if bacterial or sporozoan or blastomycetic infection had occurred—with negative results; although it is most obvious that the skin and mucous membranes generally must be easily subject to invasion by the micro-organisms which they so constantly harbor.

Serious and continuous consideration of the clinical history combined with the patho-histology would seem to argue against Cohnheim's embryonal theory, which was originally introduced in 1882, and has been recently revived by Henry Morris,[15] who, in the Bradshaw Lecture of the Royal College of Surgeons of England, in 1903, strongly advocated the views therein promulgated. The mechanical isolation hypothesis of Ribbert,[13] as well as the anaplasic theory of Hausemann[13] would also appear to fall to the ground.

But there is apparently nothing to refute, nor, be it remarked, to absolutely verify, the quarter-of-a-century-old doctrines of Thiersch and Waldeyer, who believe that cancer cells take their origin from altered pre-existing epithelial cells.

In a most instructive paper presented to the Royal Society of London, in December 1903, by Messrs. Bretland Farmer, Moore, and Walker, entitled "On the Resemblances Exhibited Between the Cells of Malignant Growths in Man and Those of Normal Reproductive Tissues," the following sentence occurs: "In a typical example of rapidly growing epithelioma it is seen that in the early stages of the proliferation of the Malpighian layer, the cells of the invading tissue at first pass through a cycle of somatic divisions, exactly as in the early stage of reproduction tissue. The resemblance may extend to the frequent production of giant cells, a common occurrence in each case. As cell multiplication proceeds, however, a change passes over the cells themselves. The protoplasmic continuity, to which the "prickly" character is due, becomes more or less obliterated, and the cells assume that appearance of indifferent germ tissue so well known as a feature of the elements of which malignant growths are largely made up.

The conclusions to which these observers came were that malignant new-growths are really nothing more nor less than "reproductive (gametogenic) tissue arising in abnormal situations and possessed of an independence and power of growth like that of the testis in the mammalian body."

The occurrence of the phenomena described by them was corroborated, in the case of the lower vertebrates, by Bashford and Murray, in January 1904.[16]

To sum up, it may be said that if an explanation were insisted upon for the causation of this disease the opinions held by Calcott Fox and MacLeod in "A Case of Paget's Disease of the Umbilicus," appearing in the *British Journal of Dermatology,* vol. xvi, No. 2, 1904, taken in conjunction with the so-called "autotoxic hypothesis," might in all probability throw some light on the subject.

The former writers remark, "It has never been demonstrated, and it seems highly improbable, that the degenerated cells which occur in the epidermis or the epithelium in Paget's disease can take on malignant characters. It appears to us, however, more reasonable to assume that the malignant growth originates in epithelial or epidermal cells which, not having degenerated, have reverted and assumed a capacity for proliferation through the prolonged action of some cause which, acting most powerfully on undifferentiated cells, produces their degeneration, than in a matrix of cells which has been deposited there at some period more or less remote." The latter assume that "The products of perverted metabolism in animal organs or tissues produce morbid effects in the individual's body."[13]

In the present instance it is conceivable that the mechanical and physiological growth of the fibroma beneath and internal to its epidermal covering may have induced, in the course of time, the perverted metabolism above mentioned. Although the growth of the neoplasm was slow, it is entirely probable that it was only quite recently that the epithelium had undergone the carcinomatous changes.

CONCLUSION.

The signification and direct bearing on practical dental and oral surgery of Paget's disease of the gums is immediately important and clear. That certain of the innocent neoplasms of the fully formed connective tissue type may undergo secondary malignant changes is a well-known fact in pathology. Thus, lipomata may become sarcomatous, and papillomata and verrucæ carcinomatous. Fibromata usually are subject, if they degenerate or become altered in structure, to calcification and mucoid softening, or ulceration when placed on exposed surfaces. It was, probably, a mere accident in the present instance that a fibroma should bear on its periphery Paget's disease. Epithelia, especially of the pavement or squamous type, are particularly prone to proliferate, and it is a matter of great surprise that the oral epithelium does not oftener produce carcinomata.

The epithelium of the mucous membrane of the cheek would almost seem to possess a large measure of immunity from it. Here there is apparently a frequent source of irritation and tissue change; and yet cheek carcinomata are most uncommon. The surface of lip, tongue, and palate are, however, favorite sites.

The extreme rarity of Paget's disease of the gums must not be taken too literally; it may be commoner than is supposed, for it is impossible to say how many fibromata have been excised which were already undergoing these degenerations but which remained unrecognized inasmuch as no microscopical examination had been made.

From the point of view of the frequency of its occurrence it might, perhaps, occupy a position intermediate between that of the cheeks and the other structures named. As the extraction of a diseased periodontal membrane will often obviate the formation and development of a dental cyst, or even perhaps sarcoma or epithelioma of the jaws, so too the removal of what is considered to be merely an "ordinary epulis" may prevent the onset of Paget's disease. Extir-

pation may really signify prevention of its inception.

Thus there are two important inferences to be derived from a study of this condition. It is of the first moment (1) to remove all sources of possible origin, and (2) to exterminate most thoroughly all newgrowths as they may arise. Preventive methods are once again impressively indicated; hence it is distinctly advisable, not solely for purposes of oral hygiene, to get thoroughly rid of all fragments of tartar buried below the gingival margin, débris of decomposing food, the products of pyorrhea alveolaris, and so on. The former can and occasionally does set up a chronic localized osteoplastic periostitis of the interdental septum, a process which, in consequence of its periosteum being feebly supplied with nerves, proceeds quite painlessly and insidiously; it may induce the formation and growth of fibroma, etc.

The early and complete destruction of all growths and their immediate surroundings is also obviously of importance; and the curetting of chronic suspicious mottled or pigmented patches on the mucous membrane when of obscure origin should never be omitted—for it is perfectly obvious that, whereas in this case Paget's disease attacked the surface of an innocent tumor, it is most probable it would not necessarily confine itself to that situation, but might select, as a site, any surface of the gum itself. Every precaution against recurrence should be taken and the patient kept under constant observation and supervision, so that any new developments might be treated immediately it was necessary.

Bibliography.

1. Paget. "Disease of the Mammary Areola Preceding Cancer of the Mammary Gland." St. Bartholomew's Hospital reports, 1874.

2. Butlin. *Medico-Chirurgical Transactions*, 1876.

3. Duhring. *American Journal of the Medical Sciences*, 1883.

4. Darier. *Comptes rendus, Société de Biologie*, 1889.

5. Wile. *American Journal of the Medical Sciences*, 1884.

6. Wickham. International Congress of Dermatology, Paris, 1889.

7. Rolleston and Hunt. *Pathological Society Transactions*, 1897.

8. Ravogli. International Medical Congress, Rome, 1894.

9. Dubreuilh. *British Journal of Dermatology*, 1901.

10. Calcott Fox and J. M. H. MacLeod. *British Journal of Dermatology*, 1904.

11. Bolles Lee. "Microtomist's Vade Mecum." 1900.

12. Schäfer, in Quain's Anatomy, vol. i, pt. ii, 1898.

13. Hektoen and Riesman. A Text-book of Pathology. 1901.

14. Delafield and Prudden. Pathology. 1901.

15. Henry Morris. *British Medical Journal*, December 12, 1903.

16. Bashford and Murray. "The Significance of the Zoological Distribution, the Nature of the Mitoses, and the Transmissibility of Cancer," *Proceedings of the Royal Society*, vol. lxxiii, 1904.

THE METABOLIC FACTOR IN ITS BEARING UPON INFLAMMATORY CONDITIONS OF THE HUMAN MOUTH: STOMATITIS, SIMPLEX AND COMPLEX.

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(Read before the Southern Dental Society of the State of New Jersey, December 21, 1904.)

WHEN some twenty-five years ago the sciences of bacteriology and pathology were so liberally enriched by the careful and far-reaching investigations of Koch and his contemporaries, it may be confidently said that a large proportion of the medical profession drifted at once in the direction of bacteriological research, thinking that they would therein discover an immediate and satisfactory solution for a large majority of the intricate problems of general pathology. Before Koch gave out the three fundamental laws of bacteriology, the processes through which bacteria produce disease were imperfectly understood. Koch demonstrated the relation of pathogenic bacteria to disease processes, having closely followed in the footsteps of Sir Joseph Lister and Louis Pasteur. The studies of Koch blazed the way for the host of bacteriologists and scientists who have so materially added to our knowledge of the different classes of agents responsible for the causation of those systemic intoxications the nature of which has now ceased to be the impenetrable problem of years gone by.

But even after the results of these valuable investigations had been added to the already overflowing literature of medical science, there yet remained problems of equal importance and significance to solve, problems without a clear understanding of which the behavior of pathogenic bacteria would still be the subject of empirical, speculative, and unproductive discussions. If such virulent organisms as the Loeffler bacillus, the diplococcus pneumoniæ, the bacillus tuberculosis, and others are frequently found to thrive in the mouths of perfectly normal individuals without giving rise to any of the characteristic manifestations which are the result of their development and toxin secretions; and if, on the other hand, the same micro-organisms do under suitable conditions bring about most dangerous phenomena, the deduction is at once evident that bacteria of themselves are powerless to cause the number of diseases attributed to their morbid activity, for which they are only partially responsible.

We know, of course, that bacteria are delicate organisms, requiring for their growth the presence of certain substances and conditions such as water, appropriate temperature, carbon, nitrogen, and oxygen in the case of the aerobic varieties, and absence of oxygen in the case of the strictly anaerobic varieties.

These factors are indispensable for bacterial development and growth, and the absence of one or more of the requirements named will lead eventually to arrest of their development and to their death. Certain areas of the body offer most inviting and propitious fields for bacterial development, particularly the oral cavity, wherein are present the most favorable temperature, the necessary degree of humidity, the presence of albumin bodies for the nitrogen supply and that of carbohydrates for the carbon supply—*i.e.* of the two elements indispensable to bacterial life. But the presence of bacteria even in these advantageous surroundings does not necessarily imply that they are the precursors

of disease processes, and it is a decidedly fortunate provision of nature that bacteria should not be able to exercise at random their pathogenic activity—for how sad and heavy would be humanity's lot if such were the case! The variety of bacteria with which we are mostly concerned is the pathogenic or disease-producing class, although it must be said that some, if not all, of the families of this variety live as saprophytes while in the latent or inactive period.

The entrance of unicellular pathogenic organisms into the human economy is marked by a period of activity on the part of the defensive forces of the body. The sum-total of these forces may be designated collectively as the individual's vital resistance, which varies in degree of ability to repulse invading pathogenic influences in direct ratio to the health status. A satisfactory and rational explanation of the reaction of the body to bacteria is as yet wanting. The question is in its infancy notwithstanding the investigations of Metchnikoff and Roux and their colleagues of the Institut Pasteur.

The problem for the sake of simplification may be divided as follows: First, the resistance to the entrance of microorganisms into the body offered by its external epithelial structures, together with such secretions as the salivary and lacrymal; second, structures existing in the body whose purpose is incidentally to eject any substance foreign to the human economy; and, third, the leucocytes and albuminoid antitoxic substances manufactured by the circulatory system and traveling therein. Metchnikoff published several years ago the results of his investigations on the ultimate fate of bacteria in the blood of normal individuals, and gave out the opinion that the leucocytes were most active agents in this connection.

His deductions have been modified by writers to suit their particular fancies, although the fact remains potent that leucocytes are under certain conditions destroyers of bacteria. The epidermis is of course a mechanical barrier to bacterial invasion. Its action may be compared to that of the cotton stopper of culture tubes. It acts by virtue of the disposition of its cellular elements, regardless of any antitoxic influence; it prevents the entrance of bacterial elements by structural continuity. The antiseptic action of the salivary fluid has been made the subject of most careful and detailed investigations by Hugenschmidt, Michaels, Kirk, Miller, and others, and while the results they have obtained tend to show that nothing exists at any time in the saliva which could exercise an antiseptic action, yet it is significant to note that wounds and injuries of the mouth enter on the healing process quicker than the same lesions would in other tissues of the body.

Under the second group of protective means we include the tonsils and other accumulations of lymphoid tissue in the pharynx, the cilia of the respiratory tract, the epithelial lining of the digestive and respiratory systems, and the reaction of the contents of the stomach and intestinal tubes. A detailed discussion of the mechanism by which these structures act as impediments toward bacterial development is beyond the province of this communication, except in so far as to state that glandular tissue probably acts as a filter or retainer, that the ciliary appendages exercise whatever beneficial effect is to be attributed to them by virtue of their continuous mobility in the direction of the external world, and that the reaction of the contents of the digestive tube plays an important rôle, when we consider that bacteria will not thrive in excessively acid or alkaline media. Under the third heading, namely, the substances found in the blood, are embraced the alexins or albuminoid antitoxic bodies, the leucocytes, and all agents capable of modifying, attenuating, or completely incapacitating given varieties of pathogenic bacteria, together with their secretions. The object of alluding to the defensive forces of the organism has been mainly to emphasize the point that it is equally if not more important to keep these forces at their maximum than it is to guard against microbic contamination.

The degree of vital resistance varies continually in the same individual, and depends to a great extent upon the regularity with which are carried out the metabolic functions of the body. The ingestion of the correct amount of food together with proper assimilation and elimination of the dissimilable metabolic waste products are conditions which—other activities being equally normal—will lead to the highest possible degree of resistance to external or internal injurious influences. The different organs of the human economy and their individual cellular components are closely interdependent, to the extent that if the nutrition of any one organ be incomplete it will eventually affect the entire system to a degree in keeping with the relative importance of such organ. We cannot for a moment expect harmonious organic interrelationship with resulting sufficiency of function if one or more of the vital organs be out of the boundaries of the normal. Perfect metabolism is a condition hardly to be expected in man as he lives in the present era of so-called high civilization. We are constantly working against the laws of nature, misusing our energies, overworking our delicate nervous mechanisms, and laboring as though it were our intention to shorten rather than to lengthen our periods of usefulness. Our present style of dress, our elaborately seasoned food, and the limited and frequently insufficiently ventilated quarters in which we dwell have had a tendency, without doubt, to predispose the organism to a number of diseases hardly known in ancient times.

These irregularities and excesses leave an impress upon the cell, the nutritional process being interfered with in proportion to the extent of the lesion. The hereditary factor, which in this connection cannot be dismissed without weighing and considering its influence upon the cell, here plays an important rôle, inasmuch as in many cases the errors of nutrition are the result of an hereditary impress upon the tissues involved, leading eventually to disturbances of varied degrees of intensity.

The errors of nutrition have been classified by Gautrelet into two large groups, those due to insufficient oxidation—the hyperacid diathesis, and those due to hyperoxidation—the hypoacid diathesis. The hyperacid diathesis, to which belong such diseases as gout and rheumatism, is characterized by the presence in the organism of the products of incomplete oxidation, acid in character. To the hypoacid diathesis belong all infectious diseases, both acute and chronic. If either of these diatheses be present the nutritional process is carried on irregularly, and consequently as the tissues are not able to recuperate from the loss of substance which is constantly going on, the defensive powers of the body soon decrease, in certain cases to the extent of not being able at all to counteract the influence of pathogenic organisms. The hyper- and hypoacid diatheses may be, as above stated, the result of hereditary influence, but their presence may also be accounted for by past injurious habits, such as excess or lack of food, the ingestion of poisonous substances, by alcohol, by excess or lack of physical exercise, by fatigue, or anything of the character of over- or under-stimulation. The degree of defensiveness of the body is regulated by the metabolic processes, being at its highest when assimilation and dissimilation are proportionate to the needs of each individual cell. If the two functions are carried on under conditions approaching the normal, the cells will be evenly nourished and will be able to put forth a degree of energy and resistance sufficient to repulse any invading variety of micro-organisms. If, on the other hand, assimilation and dissimilation be out of proportion to the requirements of the body—if assimilation be in excess of dissimilation or if the latter condition be in excess of the former—the human economy will be faultily nourished and its reactions will grow weak. If the condition persists it will eventually lead to paralysis of function.

These errors of nutrition, with the concomitant decrease of vital resistance, convert the body into a propitious field for microbic development. Certain areas are more susceptible to this influence

than others. The mucous surfaces, viz, the mucous membrane of the mouth, eye, digestive, respiratory, and genito-urinary systems under conditions of decreased vital resistance are more prone to inflammatory disorders of parasitic origin than any of the other structures constituting the human economy. In this connection it again becomes necessary to emphasize the fact that while the abnormal conditions which we have analyzed prepare the field, they are by no means solely responsible for the disturbance which may eventually arise. For that matter it must be acknowledged that the predisposing cause and the exciting cause are inseparable; one without the other is powerless to produce disease.

A careful and intelligent consideration of the several factors involved in the complicated problem of nutrition, with the consequent effect upon the body's defensive forces, at once points out the etiological solution of nearly all inflammatory conditions of the oral mucous membrane. These inflammations of the lining membrane of the mouth I have divided into two classes: those entirely localized to the areas of the oral cavity and those in which the lowering of the vital powers of the oral tissues brought about by some constitutional disorder has rendered it possible for the exciting factor—the bacteria then present in the mouth—to exercise its pathogenic influence.

The localized type of buccal inflammation I have named *stomatitis simplex,* and that in which a constitutional disorder acts as the predisposing cause, *stomatitis complex.*

Under the heading of stomatitis simplex I can include only those cases in which the inflammatory disorder is the immediate consequence of localized irritation, such as salivary deposits, carious cavities, rough edges of broken-down teeth, ill-fitting appliances intended for substitutes of the lost natural organs, also prolonged contact of the mucous membrane with substances of extreme temperatures, chemicals, tobacco smoke, etc. By the term stomatitis complex, I refer to all inflammations of the buccal mucous membrane in which the predisposing cause, an existing constitutional pathological error, has so modified the tissues of the mouth as to favor the growth and action of the microbic exciting cause. Here I include aphthous stomatitis, tuberculous stomatitis, ulcerative stomatitis, gangrenous stomatitis, mercurial stomatitis, syphilitic stomatitis, with stomatitis occurring in the course of the eruptive fevers. The so-called erythematous and catarrhal stomatitis may be considered as the primary stages of oral disturbances which if not eradicated at once may degenerate into any one of the above mentioned types of buccal and gingival inflammation.

Although the treatment of these conditions is beyond our field of discussion, it may, however, be permissible to state that due attention must be given to the constitutional factor, for in the case of stomatitis complex purely local intervention may prove of only temporary benefit, it being impossible to bring about a cure unless the deeper systemic cause be removed.

DEFINITE *VERSUS* INDEFINITE.

By ROLOF B. STANLEY, D.D.S., New York, N. Y.

IN the September issue of the DENTAL COSMOS there appears an original communication by Matthew H. Cryer, M.D., D.D.S., entitled "Typical and Atypical Occlusion of the Teeth in Relation to the Correction of Irregularities," in which the essayist takes issue with the modern orthodontist with regard to definite methods in the treatment of malocclusion. He makes the statement that "Many teeth are found within the mouth which should be removed, not only for the correction of irregularities but for the general comfort and health of the patient," and that the teachings of the new school of orthodontia are "causing many of the younger members of the profession to perform operations which are damaging to the patient."

That due consideration has not always been given to the outlines of the face no one will gainsay. This disregard of facial harmony cannot be attributed to the teachings of the new school of orthodontia, for, though there *are* rules for the treatment of each type of malocclusion, the questions of race, type, sex, etc., govern the application of those rules. As an instance, extreme cases of the mouth-breathing type require the same general movement of the teeth in both upper and lower jaw as in the simplest cases of that type. The difference is in the degree of variation from the normal, and if an error be committed in the treatment by "fixed rules" the fault lies with the operator and not with the principle.

Dr. Cryer raises the question of extraction in the treatment of malocclusion, but fails to state definitely when such practice is justified. The new school of orthodontia does not forbid the loss of teeth in orthodontic operations when it is evident that the facial lines will be marred by retaining all the teeth—that is, when it is evident that the best result can only be obtained by the extraction of one or more teeth. Such cases are rare, especially in children, and in citing them they should be accompanied by accurately made models and photographs of the face in full and profile views both before and after treatment. Otherwise no just conclusion can be reached. The evils of extracting are seen every day, and, though the practice is diminishing, there are still far too many who sacrifice teeth unnecessarily. In the light of our present scientific methods it is questionable whether the removal of one or more teeth in the cases cited by Dr. Cryer (Figs. 4, 5, 6, 7—"14," "15," "16," "17") is necessary. In the illustrations shown he has not given sufficient proof that it is. They are not extreme types, and, judging from the results obtained by those who have devoted many years to the study of malocclusion, they are clearly within the limits of correction without the loss of any teeth.

The last ten years have contributed more to the cause of orthodontia than can be found in all the years preceding, when the movement of the teeth was undertaken with no other thought than to place the teeth in more or less regular alignment—usually only the teeth of the upper jaw—and the extraction of one or more teeth was resorted to to make possible the result desired by the operator. Symptoms were treated for cause, and the result was that failure followed failure, and in many instances one deformity was brought about to balance another.

Dr. Edward C. Kirk says, in the January 1904 issue of the DENTAL COSMOS, "The scientific method was applied to its solution (the department of orthodontia), and the underlying principle of the aberrations from normality in the

positioning of the teeth was evolved in Angle's dictum that the problems of orthodontia are problems of malocclusion, and that the essential object of orthodontic treatment is the restoration to the normal condition." Is it this grand truth, from which the definite methods were logically evolved, that is causing the younger members of the profession to make grave mistakes? Where lies the fault? Do all those who employ definite methods make grave mistakes, or is it simply the younger members of the profession, or the inexperienced? To select a few cases where failure has resulted as a proof that the whole principle is at fault, and to ignore the wonderful and beneficial results obtained in a far greater number of cases by experienced and thoughtful operators, was surely not the desire of the essayist.

Dr. Cryer says that the reason for showing Fig. 1 ("1") is that "Various authors give it as an illustration of normal occlusion of the teeth, omitting to state that it is from the negro race"—"a race that is more or less prognathic." The omission seems, to his mind, to rob it of its value as an illustration of normal occlusion. Normal occlusion is a condition independent of race, type, temperament, sex, etc. The *line* of occlusion varies according to these factors, but the general relation of the teeth with one another in the same jaw, and with those in the opposite, is the same in all cases. Can normal occlusion be better illustrated than by Fig. 1 ("1") or Fig. 2 ("2")?

Fig. 3 ("13") is taken from photographs of two upper jaws and is shown to demonstrate that a small jaw can be crowded with large teeth, while a large jaw may have small teeth with spaces between them. Dr. Cryer says, for want of a better explanation it may be well to accept as a reason for this condition, "that a child may inherit the jaw of one parent and the teeth of another." He then dismisses the subject by saying, "From a practical standpoint it matters not why such irregularities exist; they are there, and must be corrected." If such inharmony can be attributed to the laws of inheritance, why is it that the small jaws with the large teeth occur to a far *greater* extent than the large jaws with the small teeth? If it "matters not why such irregularities exist," why not assume this attitude with regard to any and all pathological conditions that are known to the medical profession? The modern

FIG. 1.

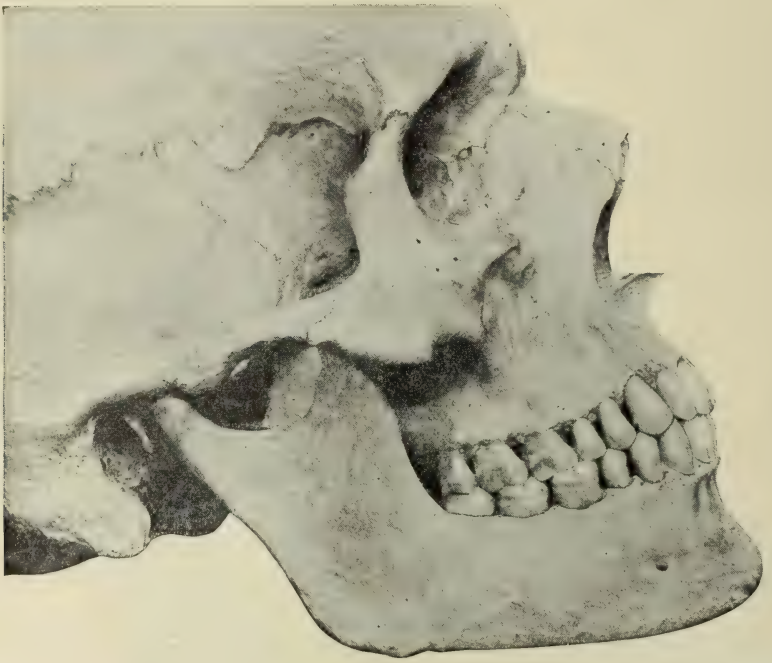


Upper and lower jaws of a negro skull, showing considerable prognathism. (CRYER.)

orthodontist does not claim to know in every instance the exact cause of malocclusion, but what *is* known today enables him to treat with greater intelligence than heretofore certain forms or types of malocclusion.

Referring to Fig. 3, A ("13, A") again, the essayist asks what the "non-extractor" would do with the supernumeraries. The question can be answered by repeating that the essential object of orthodontic treatment is the restoration

FIG. 2.



Side view of upper and lower jaws of a Caucasian skull, showing typical occlusion of the teeth. (CRYER.)

FIG. 3.



A B

Made from two upper jaws, showing a large amount of tooth tissue in the smaller jaw, A, and much less in the larger jaw, B. (CRYER.)

of the normal condition—or normal occlusion. Supernumeraries are not a part of normal occlusion.

In Fig. 4 ("14") the mesio-distal relation of the molars, premolars, and canines is shown to be correct on the right side, and the essayist says they are in equally good occlusion on the left side, but the incisors meet edge to edge. A glance at Fig. 3, A ("13, A"), which is a different view of the same denture, will show the reason for this discrepancy. Note the position of the upper left lateral. Had room been provided for this tooth at an early age a normal overbite would have resulted. To attempt to correct a condition such as is shown in Fig. 4 ("14") by extracting one or more teeth from the lower arch, as suggested, would not, according to results obtained in similar cases, and according to the law of occlusion, better the condition; in fact, the crowded position of the upper lateral would be exaggerated.

Fig. 5 ("15") shows the right side of a case to be in correct mesio-distal relation. It is to be supposed that the left side is also in correct mesio-distal relation, as the essayist says nothing to the contrary. He suggests the extraction of the upper first premolar—presumably both right and left—and then he would endeavor to draw the upper teeth back. What would be the result? The canines would occupy the place of the first premolars, while the central and lateral incisors would then have to occlude with the mesial half of the first premolars, the canines, and the incisors of the lower arch. This they could not possibly do without leaving spaces between them.

Fig. 6 ("16") shows the tilting forward of the second molars after the first molars were extracted, while Figs. 7 and 8 ("17" and "18") show no such condition after the removal of the first molars.

Fig. 4.



Upper and lower jaws in occlusion. (Cryer.)

Dr. Cryer says relative to the last two, "The four first molars were evidently extracted at the proper time." When is the proper time? He says of Fig. 7 ("17") that if the first molars had not been extracted it is probable that there would have been protrusion of the anterior teeth, as the eruption of the third molars would have pushed all the other teeth forward, providing the lower third molars had not become impacted. Let us return for one moment to what he says with regard to the development of the mandible, on page 718 (the italics being my own):

"The position of the first premolar at the time of its early development was immediately below the upper or inner angle of the jaw; as it increases in size and other molars are developed the whole

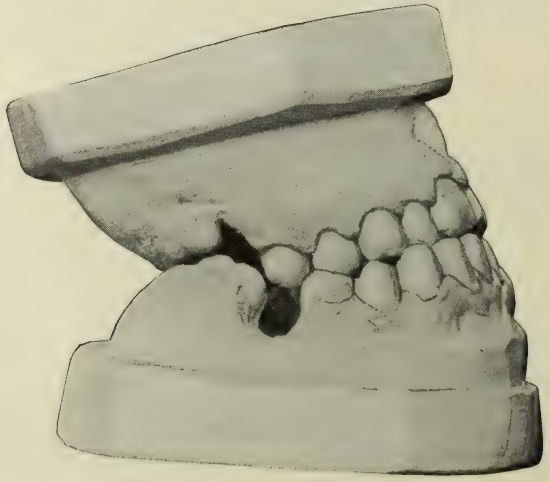
mass of cancellated tissue containing the teeth moves forward, the upper portion a little more than the lower, as is indicated by the curvature of the trabecular and small cribriform tubes passing from the main tube or canal to the roots of the various teeth. To *accommodate* this growth the *mandible* proper or the cortical portion *enlarges* interstitially as this process is carried on. To *interfere* with this *forward* movement of the teeth in the cancellated tissue would *arrest* the *enlargement* of the *jaw,* it matters not whether the interference be caused by *artificial* means or by pathological conditions. The development of the alveolar process of the upper jaw is somewhat different. While the teeth are being developed and erupting, the process extends outward and forward without the same

Fig. 5.



From plaster cast, showing malocclusion of the anterior teeth. (Cryer.)

Fig. 6.



From plaster cast, showing malocclusion of the teeth, claimed by some to be due to the extraction of the first molars. (Cryer.)

extension of the maxilla as is found in the mandible."

Applying this theory to the case in question, Fig. 7 ("17"), if the first molars had not been extracted, the lower molars would have assisted in the *enlargement* of the *mandible,* the upper teeth would have been carried forward also, and the anterior teeth would not have been too prominent to harmonize with the *fully developed* mandible and the other features of the face at maturity. If the first molars be extracted before the other molars are erupted, will not this cause the arrest in the development of the mandible by artificial means, since the other molars cannot exert their forward movement upon the teeth anterior to the first molars?

If the deformity from malocclusion is as great as is shown in Fig. 9 ("22"), requiring, in Dr. Cryer's judgment, the

FIG. 7.



From plaster cast, showing good occlusion although the four first molars had been extracted. (CRYER.)

FIG. 8.



From plaster cast, showing good occlusion although the four first molars had been extracted. (CRYER.)

extraction of the upper anterior teeth and the removal of a portion of the alveolar process, it is an exceptional case indeed, and in no way sanctions the ex-

Fig. 9.



A case of marked prognathism from malocclusion. (Cryer.)

traction of teeth in the other cases shown. The same can be said of Fig. 10 ("26").

It must be borne in mind that in number, in size, in form, and in arrangement the teeth in one jaw harmonize with those in the other. There are exceptions, such as diminutive upper lateral incisors, but these must be recognized and treated as exceptions, and not the rule. Exceptional cases cannot be made the rule for the average case, and the average case admits of treatment without extraction.

Without doubt the simplicity of the principles of the new school of orthodontia have so lessened the problems of malocclusion that many have been induced to attempt to do that for which they are not fully qualified. It is also true that in other departments of dentistry many disastrous results have followed the application of a principle that was not fully understood by the operator. It is not the "fixed rule" that is responsible for mistakes in the correction of malocclusion, but it is a lack of a more thorough knowledge of the requirements and the proper application of the scientific principles. If the principle be correct it should not be discarded because it is not understood, or because "A little knowledge is a dangerous thing." If the principle be correct that the essential object of orthodontic treatment is the restoration of the normal condition, then the definite methods of the new school of orthodontia must prevail, while the indefinite methods which ignore the law of occlusion must suffer the total extinction they deserve.

Fig. 10.



From photograph of a lad suffering from hypertrophy of the gums and alveolar process. (Cryer.)

SOMETHING DEFINITE.

By M. H. CRYER, M.D., D.D.S., Philadelphia, Pa.

THROUGH the courtesy of the editor of the DENTAL COSMOS I have been permitted to read an advance proof of the article entitled "Definite *versus* Indefinite," in this issue, by Dr. Rolof B. Stanley of New York. I conclude from a careful reading of his communication that he has not studied my paper in the September 1904 issue of this journal with the care which he should have expended upon it before assuming the attitude of critic.

In the first place he quotes me as follows: "Many teeth are found within the mouth which should be removed not only for the correction of irregularities, but for the general health of the patient." The statement correctly represents my view of the matter, and as evidence of its general soundness I offer the experience of any conservative practitioner of dentistry who has had sufficient time to observe the effects of his work in this particular field to enable him to form a judgment based upon practical experience and not upon theory or hearsay evidence. If my critic takes exception to that position there is but one alternative left for him, namely, to advocate the retention of all the teeth in the mouth under all circumstances.

But inasmuch as later in his article he admits that there are exceptional instances where the extraction of a tooth or teeth may be justifiable, I take it that the question of when or under what circumstances extraction may be the proper course to pursue becomes a matter of individual judgment, and there we would necessarily be in agreement.

Dr. Stanley, however, goes on to credit me with the statement that "The teachings of the new school of orthodontia are causing many of the younger members of the profession to perform operations which are damaging to the patient." In reply to which I have to say that as the words "the teachings of the new school of orthodontia" are an interpolation of his own, he alone is responsible for the idea which they contain. The words do not appear anywhere in my article nor have they any relation to the context of the paragraph in which they are used by Dr. Stanley so far as they express my original thought on the question. What I did say was that "This wholesale correction by rule is causing many of the younger members of the profession," etc.

Dr. Stanley criticizes me for not stating definitely when the practice of extraction is justified in the correction of dental irregularities. I have shown examples of cases where I believed extraction to have been justified in the treatment of irregularities; I did not, nor do I yet, deem it necessary to cite further illustrations, although I could cite many, for reasons which I shall endeavor to make clear later in this reply.

Of the cases cited by Dr. Stanley, Fig. 14 (September COSMOS, page 723), again raises the question of individual judgment, which of course admits of unlimited debate as to the best method of procedure. It was offered by me as a suggestive illustration of a difficulty the solution of which would be determined by considerations of expediency quite apart from what might be the ideally best procedure from the standpoint of a fixed rule or principle.

As to Fig. 15, again the question of a difference of opinion as to the method of procedure is at issue, and is therefore debatable as was the previous case.

With regard to Fig. 16, it was presented and attention called to it as one of the illustrations which had been used to emphasize the contention that extrac-

tion of the teeth may lead to serious disarrangement of the regularity of the denture. Nobody, so far as I know, disputes that fact; but because in some instances serious results follow injudicious extraction, it by no means follows that in all cases serious results follow extraction, and my Figs. 17 and 18 are offered in illustration of the fact that extraction may be done judiciously and intelligently —and that then, far from producing evil results, the operation may be made to produce the exact result aimed at in the performance of the operation, namely, the regular alignment of the dentures. One represents the results of ignorant and ruthless removal of teeth; the other, the judicious and intelligent performance of the same operation. I thought I had made that point clear, but Dr. Stanley seems to have overlooked it.

Dr. Stanley uses effectively a quotation from Dr. Kirk. Since Dr. Stanley has drawn the third person into the discussion, I trust I may be pardoned for doing likewise, and will refer to Dr. Kirk, not from his writings or speeches, but from the standpoint of his professional practice. Take the illustration Fig. 18, which is here reproduced from my article in the September 1904 issue of the Cosmos. It is a picture taken from a plaster cast of a mouth of a young woman whom Dr. Kirk had in charge from infancy. The first molars were soft and rapidly disintegrating. Dr. Kirk, with his usual fine logical deduction, decided it would be impossible to retain them in adult life. The anterior teeth were somewhat irregular and crowded. After considerable thought he concluded that the first molars should be extracted. This was done at about the time the anterior cusps of the second molars made their appearance. Absolutely nothing was done in regard to the correction of the anterior teeth; they naturally took their proper position, with the results shown in the illustration. The profile of the lips and chin of this young lady are in harmony with the rest of the face, and Dr. Kirk has had no reason to regret his decision in the case.

"Fig. 18."



From plaster cast, showing good occlusion although the four first molars had been extracted.

Perhaps I have not made it quite clear why I used Fig. 1 to illustrate the idea of normal occlusion as held by various writers. It is certainly normal to that particular negro, but it would be just as reasonable to give the occlusion of a horse or dog and state that they are normal. The point is this; modern orthodontists show, upon the screen, a profile portrait of the Apollo Belvedere as an illustration of manly beauty, and then follow it with Fig. 1, the skull of a prognathous negro, as an illustration of normal occlusion. I have seen patients coming directly from

the orthodontist having just such an arrangement of teeth. They were symmetrical lines with "normal occlusion" and with prognathous appearance.

I have already called attention in various writings to the delusiveness of the idea expressed by the terms "typical" and "normal" as applied to anatomy. I can readily conceive the possibility of ideally correct examples of anatomical structure occasionally existing, but, as I have elsewhere pointed out, it is the variations from the anatomical ideal that most concern us, because it is these that we most commonly meet and that demand our attention. I have as yet seen no satisfactory definition of "normal occlusion" put forth even by those who most frequently use the term, and I doubt very much if a true definition of it will be forthcoming until a better knowledge of all that is expressed by the term is available. Certain it is that any definition of "normal occlusion" will have to recognize the fact that individual variations from the typal arrangement are the rule, not the exception, and therefore that "normal" has its individual application as well as its general or racial significance.

In reference to large teeth in small jaws and small teeth in large jaws, Dr. Stanley asks, "If such inharmony can be attributed to laws of inheritance, why is it that the small jaws with large teeth occur to a far greater extent than the large jaws with small teeth?" The doctor admits that small jaws with large teeth exist, which is just what I wish to convey, but I do not believe that they are more common than the large jaw with small teeth. I can readily understand how one who makes a specialty of orthodontia would think so, for those are the class of patients who are referred to him for consultation as to the correction of irregularities of the teeth by mechanical appliances or otherwise. But if one studies a large collection of skulls he will find that these two conditions are almost equally divided.

Dr. Stanley says, "It must be borne in mind that in number, in size, in form, and in arrangement the teeth in one jaw harmonize with those in the other. There are exceptions, such as diminutive upper lateral incisors, but they must be recognized and treated as exceptions and not the rule. Exceptional cases cannot be made the rule for the average cases, and the average cases admit of treatment without extraction." I readily indorse the greater part of this statement, but would have added a little more by saying that the average cases require no treatment, either by extraction or the correction of irregularities. It is the "exceptions" that require treatment.

There is a rather strong tendency throughout Dr. Stanley's paper to suggest that I advocate the extraction of teeth without due and proper consideration. Those who have followed my writings and teaching for over twenty years will be able to testify that such is not the case. At the same time, if a tooth, or several teeth, or the whole jaw, were doing damage I should recommend their removal just on the same principle that I would indorse the removal of a finger, a leg, an arm, or any other portion of the body it if were absolutely necessary.

PROCEEDINGS OF SOCIETIES.

FOURTH INTERNATIONAL DENTAL CONGRESS, ST. LOUIS, MO., AUGUST 29 TO SEPTEMBER 3, 1904.

(Continued from page 103.)

SECTION II: Etiology, Pathology, and Bacteriology—*Continued.*

Chairman—Dr. R. H. Hofheinz, Rochester, N. Y.
Secretary—Dr. M. L. Rhein, New York, N. Y.

Fourth Day—Thursday, Sept. 1.

The meeting having been called to order, Dr. W. D. Miller, Berlin, Germany, presented a summary of the paper submitted by Dr. F. Vicentini, Chieti, Italy, on "Leptothrix Racemosa," as follows:

"Leptothrix Racemosa"—summary of paper.

Dr. Miller said: I suppose most of those present are acquainted with a work brought out by Dr. Vicentini some years ago, in which he dealt with a micro-organism discovered by him in the human mouth. This micro-organism he named *Leptothrix racemosa,* and regarded it as the parent plant of the great majority of the forms of micro-organisms found in the mouth. This present essay is in part a review of the different criticisms upon the work just referred to, and it would therefore be impossible to give a *résumé* of this part of the paper.

In the second part of the paper he deals with caries of the teeth. He says he does not feel competent to treat of this subject, and I do not think that this part of his work has come up to the standard of his other investigations. His views on this subject tend to reduce the importance of external agents. He concludes by referring to the views of Dr. Eben M. Flagg that caries is an eruptive disease proceeding from the inner to the external part of the tooth. His own views, he says, are in some respects not so much at variance with those of Dr. Flagg. In this point of course I must disagree with him.

Discussion.

Dr. E. C. Kirk, Philadelphia, Pa. I should be very glad to have Dr. Miller express his own view on the position taken by the essayist in regard to the importance of this organism, leptothrix racemosa. As I understand it, he claims that it is the parent organism of a large number of the bacteria that occur in the mouth, and that the various coccic forms and rod forms are merely the fragmentary parts resulting from the breaking down of the sporulation heads and stems of this rather large organism.

I have followed Vicentini's methods and have been able to find in the secretions of my own mouth specimens of the leptothrix racemosa. It is certainly a very interesting organism, although I have examined it only in a rough way.

It does seem to me that the contention Vicentini makes should have a respectful hearing. Not being sufficiently well acquainted with the biological evolution of these forms I should be glad to hear from Dr. Miller on this point. I understand that such organisms as the micrococcus of sputum septicæmia are claimed by Vicentini to orignate from it?

Dr. MILLER. Vicentini considers the various coccic and rod forms as parts in the cycle of development of leptothrix racemosa. You can see the central thread only in parts where the micrococci are not so numerous, and Vicentini claims they are connected with the same by a little thorn and are developed from it. Formerly we thought they were nothing but leptothrix threads about which micrococci had accumulated. But according to his ideas they are organically connected. Sometimes they may be seen to grow out into long threads, so that we have the cycle of development of different forms.

I believe that Vicentini claims that nearly all the forms of organisms found in the mouth may be looked upon as coming from leptothrix racemosa. Personally I am not convinced that such is the case. It seems more likely, and our cultural investigations in bacteriology point to this conclusion, that there are varieties of bacteria in the mouth which may be different stages in the development of leptothrix racemosa.

Dr. L. D. HURST, Denver, Colo. You accept then the position of Vicentini that the round coccal forms are in organic connection with the stem, and that it is not simply chemiotaxis?

Dr. MILLER. I have not seen it myself.

Dr. HURST. Would not the evolution of the process indicate that there was a vital connection?

Dr. MILLER. Yes, there may be, but as I stated, I have never seen thorns connecting the micrococci with the stem so distinctly as to be absolutely sure of it. Others claim to have seen them very clearly.

Dr. HURST. If it were purely chemiotaxis, how could you account for the grouping on one end of the stem?

Dr. MILLER. The growing portion of the stem is more active, as it is for example in yeast fungus. But, mind you, I do not look upon these appearances as a result of chemiotaxis. We have undoubtedly a wonderful and most important organism in leptothrix racemosa, but its life-history is far from being cleared up.

Dr. M. L. RHEIN, New York, N. Y. With regard to a practical application of the subject you presented to us yesterday, that is, the deposit of plaques on two surfaces acting as a preventive of dental caries, do you include, in that, teeth that are comparatively clean and free from plaques and still show the microscopic deposition of a plaque of leptothrix racemosa? Williams' deductions on that subject have gone very far to give this organism an importance in the plaque stage. Do you make any differentiation in a plaque of this particular kind on comparatively clean teeth?

Dr. MILLER. I do not make any distinction of that kind, and I was not aware that the leptothrix racemosa takes any more prominent part in the formation of the plaque than other micro-organisms. It is a point, however, which I have not particularly looked into.

Dr. G. W. COOK, Chicago, Ill. I was going to ask Dr. Miller if he had noticed that cocci were sometimes formed at the end of the thread.

Dr. MILLER. Of the secondary thread?

Dr. COOK. Yes, I find in some cases that a bulbous thread is given off, while in another it will run off without any cocci at the end.

"SIALOLOGY."

Dr. E. C. KIRK then made the following remarks on the paper by Dr. Jos. P. MICHAELS, Paris, France, entitled "Sialology: Differential Analyses—Elements of Value in Medical Diagnosis":

I want to thank Dr. Michaels publicly not only for the suggestion he has made, but also for the enthusiasm with which he has been able to infect me in carrying on this work. In the beginning it was like the study of the Rosetta Stone to Egyptologists. Medicine is familiar with the examination of urine as a means of diagnosis, but Dr. Michaels claims that saliva furnishes a more reliable picture than the urine because what we find in the saliva represents the waste products of nutrition

dialyzed through the glands. They are the ash, the overflow of nutrition. If we can interpret what they are and what they mean we have done much to solve the problem. I am happy to say that in my own work I have been able to determine the chemical character of some ten or twelve of these important chemical substances and the more I can determine the more accurate the picture becomes.

I do not like to say too much about it as I am enthusiastic by nature and I may overstate the case. But I have been able to make saliva readings which have indicated certain liver diseases—particularly cirrhosis—and in conjunction with the urine to determine the causes of certain cases of neurasthenia with excessive nervous manifestations, and by understanding what was the irritating chemical agent producing these outbreaks, to suggest certain therapeutic treatment which has corrected it and so borne out the laboratory experimentation.

I want to bear testimony to the practical value to dentistry, to humanity, of the work that Michaels has presented. In making his salivary records it is his routine custom to carry through a corresponding investigation of the urine. His methods of uranalysis are not those of the ordinary analyst, but he applies the same methods to the study of the urine that he does to the saliva.

I believe that along this particular line of work, dentistry will ultimately make a contribution of almost equal value to medicine as that which it made by its contribution of anesthesia. (Applause.)

The Chairman: Dr. Kirk has spent much time and intellect upon the working out of this problem, and we thank him for his kindness in presenting it in such an able way.

Dr. M. L. Rhein, New York, N. Y. I want to emphasize what Dr. Kirk has said about our obligation to Dr. Michaels for his work. The chemical analyses of the oral fluids will never in themselves give sufficient data upon which to base a careful diagnosis of constitutional ailments. I say not in themselves, but in conjunction with a careful clinical examination of the minor differences that present themselves to the eye in the mouth of people whose equilibrium is more or less divergent from the normal. In this I think it will play an important part and will form the basis of very accurate diagnosis.

A paper by Dr. C. F. W. Bödecker, Berlin, Germany, was read by Dr. Kirk, entitled:

Percussion in Dental Diagnosis.*

The first mention of percussion as a means of physical diagnosis is found in the works of Hippocrates, though it was not until 1722 that Avenbrugger (*Inventum novum*), and later Corvisart, Piorry, and others published its scientific principles and its application. Since that time much has been written on this subject from a medical standpoint, while in dental literature it is mentioned mostly during the last two decades. Percussion in dentistry has been considered solely as a means of eliciting pain in cases of advanced pericementitis. In the following, however, I will attempt to explain that the percussion note of a tooth affected with degenerations of the pulp, incipient pulpitis or pericementitis is altered long before percussion itself is painful.

Degeneration of the pulp tissue, as well as incipient non-purulent pulpitis, are diseases which often produce reflex phenomena in other parts of the body, and their location sometimes gives us much trouble, especially when the disease occurs in apparently sound teeth. Every dental practitioner of experience has met with patients who for months have suffered from what was supposed to be neuralgia of some branch of the trigeminus, the facial, the vagus, or even the brachial plexus, which subsequently was found to be caused by an irritation in the pulp of some tooth. The teeth in these instances, mostly are sound and give neither pain

* [For the theoretical portion of this paper I am indebted to my son, Henry W. C. Bödecker, B.S., M.D., D.D.S.—C. F. W. B.]

nor discomfort upon pressure or mastication. It is in these cases that percussion will be found to be of the greatest service in making the proper diagnosis.

To differentiate the normal from the abnormal percussion note, as the sound given out by the body percussed is called, requires some practice and an understanding of the principles underlying the production of sound.*

Physics teaches us that sounds may be divided into musical and non-musical or mixed sounds. The former are of longer duration and are produced by periodical sound waves with regular intervals, so aptly likened by Helmholtz to the long and regular swells of the ocean. The non-musical or mixed sounds are brought about by irregular sound waves, and may be compared to water whose surface is broken by waves of different heights and strength. The percussion note, and for that matter all sounds that do not possess the character of true musical sounds, are included under this head. In order to detect and understand variations of the percussion note, a knowledge of the elements or acoustic properties of sound in general is necessary. In percussion the most important of the elements are intensity, pitch, quality, and duration.

Intensity or strength of a sound depends on the amplitude (height) of the sound waves, and varies directly as the strength of the percussion blow.

Pitch is determined by the length and rapidity of the waves. The smaller and more rapid the vibrations, the higher will be the tone, while the longer and slower the vibrations, the lower the tone. In dental percussion pitch is changed by the relative position of the tongue, lips, and the lower jaw. The best position for these parts during percussion is the one they assume during the act of singing. If the mouth is wide open and the soft palate is raised the resonance of the teeth will be higher in pitch than when the mouth is nearly closed and the soft palate is relaxed. Even under these conditions the pitch of almost every tooth varies slightly from that of its neighbor, or from the corresponding tooth of the opposite side. It is therefore impossible to lay down a definite rule for the pitch of the dental percussion note. Stress has been laid on the relatively unimportant subject of pitch, that the practitioner may not confound it with the most important element of the dental percussion note, that of *quality*.

Quality of sound, determined by the form of its waves, is that peculiar characteristic by which we may identify it as proceeding from a particular source. It depends on the fact that many sounds that reach the ear are not simple but really compound systems, being composed of a predominant tone, called the fundamental, and one or more secondary tones, the overtones. Upon these overtones, associated with the fundamental, the differences of form of the compound sound waves depend. The number of the vibrations of the fundamental determines the pitch of the compound sound, while the quality is determined by the number, the order, the relative intensity, and the relative phase of the overtones.

Duration of a given sound varies with its pitch. The higher the pitch the shorter the duration, and *vice versa*.

Of the four elements of sound described, namely intensity, pitch, quality, and duration, the one that almost exclusively concerns us in dental percussion is *quality*. The variations in the quality of the percussion note of greatest value to us, are three in number, and are designated as the clear, the dull, and the flat percussion note. The clear or nor-

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* The following works contain literature on this subject:

"Encyclopedia Britannica." New York, 1883, vol. xv, p. 815, and vol. vii, p. 593.

H. von Helmholtz, "Die Lehre von den Tonempfindungen." Braunschweig, 1896.

J. Tyndall, "On Sound; a Course of Eight Lectures." London, 1893.

Carhart. "Mechanics, Sound and Light." Ann Arbor, 1890.

Adolf Weil. "Handbuch und Atlas der Topographischen Percussion." Leipzig, 1880.

A. L. Loomis, "Lessons in Physical Diagnosis." New York, 1896.

Bödecker, "The Anatomy and Pathology of the Teeth." Philadelphia, 1894, p. 283.

mal percussion note is the one elicited by tapping upon the crown of a healthy tooth in the direction of its root, whose pericementum and adjacent tissues also are healthy. The tone in this instance will be a comparatively ringing one. All the other healthy teeth in the same mouth will have this same quality of ring, though all may vary in pitch. As soon as the tooth or its surrounding is diseased, the note loses its clear ringing quality and becomes dull. In the earliest stages dulness is but faintly perceptible, but, as the pathological process becomes more aggravated the dulness of the percussion note increases until at last, when all the ringing quality of the note has disappeared, we obtain an absolutely flat percussion note.

Upon the ability to recognize the slightest dulness in the percussion note depends the practitioner's success in locating the seat of the disease in its earliest stages. This appreciation of dulness can only be acquired through training the ear by practicing percussion whenever opportunity affords.

The technique of percussion differs somewhat in medicine from that employed in dentistry. In medicine mediate percussion is resorted to,—that is, the blow is struck with fingers or hammer, not on the surface, but on some intervening substance applied to it, the plexímeter or the index finger of the left hand. In our specialty, however, we use the immediate method of percussion,—that is, we tap with the handle of an excavator or any such instrument directly upon the tooth. The method of tapping may be briefly described as follows: Grasp the handle of the reversed instrument as though holding a pen, and with a slight movement at the wrist tap with the end of the handle against the tooth. In medicine percussion as a means of physical diagnosis is employed for eliciting sounds which, differing in intensity, pitch, quality, and duration, serve to mark the anatomical position and the pathological changes of the underlying organs. The percussion note of any area largely depends upon the amount as well as the physical condition of the vibrating tissue. The denser and more elastic the tissue, the greater the vibrating area and the clearer and louder the percussion note; on the other hand, the softer and more unelastic or spongy the tissue, the smaller the vibrating area and the flatter and softer the percussion note. In dental percussion the vibratory waves pass along the tooth with great ease and rapidity; when they reach the pericementum, however, their strength and rate of progress is very much decreased. If the blow has been more than the merest tap the vibration waves pass through the pericementum into the bone. Here again, if this tissue is in a normal state, their strength and rate of progress is greater than in the pericementum, but not as great as it was in the tooth. This is explained by the relative density of the three structures. As mentioned before the denser the tissue the more easily it will vibrate during percussion; therefore, of the three structures in question the tooth vibrating the most will give the predominant or fundamental note to the percussion sound. As teeth are never exactly of the same shape and size, the tone emitted by them will be different in each instance, and as the fundamental determines the pitch of the compound sound it will be readily understood why the pitch of the dental percussion note varies in each case. The tones given out by the vibration of the pericementum and the bone being less intense and less clear, will determine the overtones of the percussion note. The pericementum, the softest of the three structures, inhibits the vibrations to the greatest extent. If there is an absence of pericementum, as in implanted teeth firmly attached to the bone, we obtain a clear, hard percussion note; if the pericementum be normal, then we elicit a softer sound, the normal percussion note. If, however, the pericementum has through any cause, as infiltration, hyperemia, inflammation, or degeneration lost its normal density and elasticity, its vibratory power will be diminished in proportion to its changed physical condition and the percussion note emitted will be dull or even flat. The vibrations of the bone struc-

ture, giving a tone hard in character will, in the percussion note somewhat neutralize the softness produced by the vibrations in the pericementum. If then, the pericementum completely obstructs vibration, the percussion note becomes absolutely flat, having lost the hard tone heretofore received from the bone. The sound given out by the bone also varies, depending on density, amount of blood, etc., and distance from the antrum.

To illustrate more clearly the theory of the dental percussion note, we may take the example of the sound emitted by a clock standing upon a wooden table. The ticking sets up vibrations in the clock, and these being communicated to the table, increase the loudness and change the character of the sound. If now, we successively place cloth of increasing thickness between the table and the clock, the sound with each additional layer becomes duller and duller. To return to the original proposition, the tooth being the clock, the table the bone, and the cloth the pericementum, we readily see how, with variations in thickness and elasticity of the last tissue, the percussion note will be changed in character. Up to this point the effect of the pulp on the vibrations of the tooth has not been discussed. This was done in order to more simply explain the relations of the tooth to its surrounding structures during percussion. The pulp contributing its share to the volume of the tooth, may by an alteration in its physical character change the quality of the sound emitted by the tooth upon percussion. Greater tension due to blood pressure, or degenerations, or the presence of gases in the pulp, all influence the vibratory power of the whole tooth. We all have noticed the difference in the clearness of the sound when we strike a glass of plain water and when we do the same with a glass filled with effervescent water. Although this example is exaggerated, as the relative volume of the tooth to pulp and glass to water are not the same, yet the physical facts are nevertheless the same in each case.

From what has been said before, I believe it hardly necessary to give a detailed discussion of the effects upon the percussion note of different strengths of blow. In short, the stronger the blow, the farther will the waves penetrate into the surrounding tissues, so that for deep percussion, a hard, while for examining the pulp and the pericementum but slight taps are employed.

What can interfere with deep and superficial percussion, and what may change the quality of the note, has already been explained. One point more I wish to explain, that is the direction of vibratory waves in percussion. It must never be forgotten that the waves travel in the direction of the percussion blow. The vibrations being greatest in the direction in which the waves are traveling, they produce the chief factor in the sound emitted. If then they encounter any obstruction, the effect on the sound will be more marked than if this obstruction had lain off in some lateral direction.

From what has been said in the foregoing, it becomes evident that in percussion for our specialty we have to deal with quite faint, non-musical sounds, and I am sorry to state that it is difficult, if not almost impossible, for anyone not possessing some musical talent or training to accurately discriminate between dull and clear sounds. The writer having for many years noticed the change in the quality of the sound of the teeth affected with degenerations of the pulp, incipient pulpitis or pericementitis, mentioned this fact at one of the meetings of the First District Dental Society of the State of New York, in 1888 and later, in his work. Upon discussing this subject in private with dental friends, the writer was surprised to hear that these gentlemen were unable to notice any difference between the quality of the percussion sound of teeth affected with slight pulpitis or pericementitis, and the sound given out by tapping upon a sound tooth of the same mouth.

Soon after this occurrence the writer was consulted by one of our great singers, who suffered from pain in the *lower* incisor teeth, which, upon careful examina-

tion by means of a fine exploring instrument, proved to be sound. Hot and cold water applied to the teeth of the affected side of the mouth increased the pain but gave negative results as to the true locality of the trouble. Upon percussion, the writer found that the *upper* left first molar emitted a slightly dull sound, but neither pain nor discomfort was produced by the tapping upon any of the teeth in the mouth. When the upper molar was opened, the pulp removed, and the canals filled, the pain in the lower incisors ceased at once and never returned. During percussion the patient was asked whether he noticed any difference in the quality of the sounds elicited by the teeth, when he replied in the affirmative, stating at the same time that, in his opinion only those possessing musical training or talent would be able to hear this difference. This then explained my friends' inability to discriminate between dull and clear sounds in dental percussion. Since this occurrence, the writer has made it a rule, whenever searching for teeth affected with incipient pulpitis or slight pericementitis, to ask the patients whether they notice any difference in the quality of the sound given out by the affected tooth upon percussion. The result of this inquiry has been that usually all patients with musical talent or training notice the difference in the quality of the tone of the affected tooth upon percussion, while the others notice but little or no difference.

In physical examination we also have to consider the general condition of all the teeth in the mouth. In some instances, as explained before, the teeth of patients upon percussion always give out a dull sound. These teeth usually have short roots and are somewhat loose in their sockets, although their pericementum appears normal. Such patients may be young or in the prime of the life, whereas we meet with persons quite old whose teeth, when firm in their sockets, give out a clear sound upon percussion. As mentioned before we have to take into consideration also the length as well as the number of the roots which the tooth possesses. As a general rule, we find that a tooth with two roots gives out on percussion a sound a trifle higher than does a tooth of but one root, while the upper canines and first molars elicit the clearest sound of all. Therefore, in making by means of percussion, a diagnosis, especially in the beginning, it is advisable to compare the sound of a tooth with that of its neighbor as well as with its fellow on the opposite side of the mouth. Although, as has been demonstrated by Zuckerkandl and others, in many instances the size, shape, and location of the antra in the same cranium may vary considerably. If this is the case, there will be a marked difference in the percussion sound of the teeth situated below each antrum. The four incisor teeth of the upper jaw, if normal, yield on percussion, sounds nearly equal in clearness, while the upper canines having the longest roots, as mentioned before, elicit the clearest sound of all. In a series of percussions from the upper first bicuspid to the upper second molar we notice a gradual increase in the pitch of the sound, due to the existence of the antrum, which, being filled with air and communicating with the nasal cavities, cause a more or less tympanic resonance.

If the pulp of a tooth, the pericementum, or its surrounding bone tissue is inflamed, the vibrating area will be small, and the sound elicited is correspondingly dull. By the inflammatory reaction the physical condition of the tissues is altered; they more or less return to their embryonal state, thereby altering, as we have seen, the resonance of these tissues. Therefore, when the pulp of a tooth is affected with an irritation, pulpitis, or the pericementum becomes inflamed, we shall be able to notice upon *slight* percussion a sound somewhat duller than the normal; while, its neighbor or its fellow on the opposite side of the mouth, upon percussion usually produces a sound of normal quality. In comparing the resonance of a tooth with that of its neighbor or its mate on the opposite side care must be exercised to strike the teeth in the same direction.

In cases of slight circumscribed pericementitis we are often enabled to localize the inflamed portion in the pericementum, unless this be situated on the mesial or the distal surface of the root, and unless the crown of the tooth stands in close contact with those of its neighbors. Percussion upon the crown of a tooth in the direction of the inflamed spot will produce a somewhat dull sound. Therefore, if pericementitis be located in the lingual portion of the root of the tooth, slight percussion upon the labial surface of the crown, in the direction of the inflammation, will produce a duller sound than that evoked when with the same instrument the tooth is tapped on the lingual surface. If, on the contrary, pericementitis be located in the apex of the root, percussion in that direction upon the crown of the tooth will evoke the characteristic dull sound. In this manner we are often enabled to ascertain which of the roots of a molar or of a first bicuspid may be inflamed.

The degree of dulness of the sound, as explained above, will depend upon the degree of the inflammatory condition of the pulp, the pericementum, and its surrounding bone tissue. An analogy we have noticed in the illustration of the clock; there the sound emitted became the duller the thicker the amount of cloth was upon which the clock stood; so in this instance, the more diffused the inflammation around the root of the tooth, the duller will be the sound and the greater the sensitiveness on percussion. In more advanced stages of acute pulpitis, or pericementitis on percussion of the affected tooth, we notice, besides a distinct dulness in sound, sensitiveness or pain, increasing in severity with the advance of the inflammatory process of the pericementum.

The writer has made use of this method of diagnosis in his daily practice for many years and is happy to state that by it he has been able to locate the most perplexing cases; and he sincerely hopes that by practice the majority of our profession may derive the same benefit by its employment.

Discussion.

Zahnarzt Herrmann Rauhe, Düsseldorf, Germany (translated by Dr. W. D. Miller). Although I recognize the importance of the sense of pain brought about by percussion which we use to diagnose whether a tooth is alive or dead, I do not think we are in a position to diagnose by percussion alone; but the sound produced may be a valuable means of determining the condition about the root, especially where there are large abscesses or cysts or where the root extends into a cavity. In this case the sound will be different from that of a healthy tooth and with experience a definite conclusion may be arrived at.

Dr. M. L. Rhein, New York, N. Y. I believe percussion has its use in dental diagnosis, but I do not coincide with the writer that any such extended use of it as he advocates will ever be a possibility. Yet I do not contend that some one particular person may not have a special auditory sense so trained and delicate that it may be an invaluable aid in the diagnosis of pathological conditions to an extent that would be an impossibility in another person. We all know the ordinary uses of percussion, and this paper has been well written and is a clear development of the subject.

Dr. R. H. Hofheinz. No doubt all of us have relied upon percussion to diagnose certain cases; most of us, however, have only differentiated between a normal tooth and a transplanted or replanted tooth. The great difficulty in the use of this method as advocated by Dr. Bödecker will be to educate the ordinary ear to the sounds of a normal tooth. It is only when we have established a normal sound—as the sound of A, after which a violin is tuned—that it will be possible for most of us to diagnose pathological sounds.

The sound is duller in pericementitis than in the normal tooth. The more sound has to travel through organic tissue the less clear it is. If there is a hyperemic condition there is less possibility for the clear sound to be transmitted. An additional factor as to the

sound of the first molar may be that the mesial root often perforates into the antrum. That will give an additional clearness of sound.

In diagnosing pulp-stones percussion may become of great service. We must look for a medium sound between the normal and the replanted tooth. There is here additional calcareous deposit and therefore possibly an additional clearness of sound. Provided there is great inflammation owing to the nodules, we have a duller or a more normal sound because the dulness of the pathological condition of the pulp would counteract the clearness which might have been brought about by the calcium deposits themselves.

There is no doubt that the most distinctive difference is that between a normal tooth and one that has been replanted; where the pericemental membrane is destroyed or is only embryonic tissue, and is therefore not as firmly formed as normal membrane, thus forming less obstruction between the bony walls.

Whether it is possible to use this diagnosis in all cases is questionable, because very few have the musical ear to discriminate between the relative sounds, as was well accentuated by the author of the paper.

Dr. R. C. Young, Anniston, Ala. I think this is a practical means of diagnosing a case where the patient cannot assist us and cannot locate the pain. The writer says he can diagnose pulpitis and pericementitis — two things absolutely different. My idea of the ringing sound given out by percussion is that the capillaries are filled with blood and may act as a cushion. But when there is a peridental irritation there is no difficulty in finding it. Why? Because the capillaries are dilated and the pressure is greater.

I take an old excavator and a little warm gutta-percha and find that this gives a response of pain. Now touch the same tooth with a particle of ice and the patient will feel relieved. Put ice on a normal tooth and it will respond by pain. I think we shall have to depend more upon response by pain than upon percussion.

Dr. Herrmann Rauhe, Düsseldorf, Germany, then read his paper "Zur Ætiologie und Therapie der Kalksalzarmut," which was summarized by Dr. W. D. Miller, Berlin, Germany, as follows:

Deficiency of Calcium Salts.

The chief cause of caries is deficiency of calcium salts. Caries is not brought on so much by change of habits as by the fact that the lime salts of our foods are made useless by the way in which they are prepared. The wealthier class of Americans live on meat, which contains little lime salts, while the poorer classes live chiefly on starchy substances which likewise contain very little. The result is that both classes suffer much from caries. These salts are taken out of our food by our cooking methods, which deposit them on the sides of the cooking utensils. Experiments with animals show that lack of calcium softens their bones Deficiency of these salts shows itself more readily in the bones than in the teeth. Hogs fed on potatoes have soft bones, while game fed on large quantities of lime salts develop stronger horns and bones than where the amount is less abundant. As to the effect of the amount of lime in the soil on vegetables, Röse concludes that whether the soil be rich or poor in salts, their quantity in plants grown on these soils will be subject to but slight variations. The essayist does not agree with Röse and cites the fact that after a long drought, when there is not enough moisture to dissolve the lime salts in the earth, the plants do not take up enough to nourish the animals feeding upon them, and weakness of their bones is the result. Women suffer from caries especially when the strain of forming the bones of a fetus is put upon them. Pyorrhea alveolaris may be accounted for by the lack of lime in the food. He also thinks there is a connection between chlorosis and anemia and such deficiency, as good results have been obtained in these cases by the administration of calcium salts.

Discussion.

Dr. W. D. Miller, Berlin, Ger. The question of the pathology of calcium-salts-deficiency has been much discussed in Germany, especially by Röse, who thinks that the susceptibility to caries noted in different districts could be accounted for in this way. Recently, however, he has modified his views, and in his last lecture on this subject he said that it did not make much difference where a plant was cultivated, its calcium constituents would be about the same. We also know that a hard and a soft tooth contain about the same amount of lime salts. Röse has been indefatigable in his investigations upon this subject. In some districts both the soil and the water contain large quantities of calcium salts and yet the people have bad teeth. He says that in this case, however, the people do not drink the ordinary water but preserve the rain water and drink that.

Again, he says even in districts containing much calcium in the earth and water people may suffer from caries because it is precipitated in the boiling process to which we subject our foods. You see there are many factors to be considered before a conclusion can be arrived at. Röse is of the opinion that undoubtedly where there is a large percentage of lime salts in the water, which remain in solution in it after it is boiled, those who use such water will have well-developed teeth and will suffer little from caries. Whether he still maintains that idea to its full extent I do not know. A few weeks ago he expressed the opinion that the relative immunity to caries was due to the strong alkaline reaction of the saliva.

Herr Rauhe has carried the question farther on, to the connection between calcium-deficiency and other diseases. I have no doubt that there is something in this. Many foods contain less lime salts than are necessary. A child brought up on buckwheat cakes and tapioca puddings and the like will receive less of the salts than are necessary to build up his growing skeleton. But we who live on a normal diet obtain all the salts we need.

Herr Rauhe has told us that the bone is first affected by the deficiency. I took four pups from the same litter and fed two normally, and the other two with artificial milk and other foods containing little or no lime salts. I found the latter two grew more slowly and that their bones were so soft that knots could have been tied in them. Their teeth, however, were perfectly normal and just as well developed as those of the dogs fed on normal food.

The conclusion is that the bones are affected much sooner than the teeth. In people who live in regions defective in lime salts we should accordingly expect to find bone diseases more frequently than is the case. I am not aware that bone diseases are especially frequent where caries is frequent. This is an objection that I have made to Dr. Röse and he has not yet given me an answer with which I was perfectly satisfied.

Dr. G. W. Cook, Chicago, Ill. I think this subject has been discussed for many years. The old theory was that calcium salts were necessary to plant life. Later physiological studies have shown, as has been stated, that it does not matter whether the plant food is rich in it or not, that the plant reaps the necessary quantity of calcium.

There seems here to be a condition of nutrition, and I believe there is some physical law that enters into this that we are not familiar with. The salts do not exist in the circulation as salts; they are in a dissociated condition, and when they are formed in a bone or tooth-structure they are formed there under a physical law. The crystals that form the enamel of the tooth-structure are living under a certain physiological pressure, so that the formation of the crystals is looser in some and more compact in others. All the quantitative proportions are present, but not in proper combination to make a strong tooth.

In the physio-chemical laws involved in the building up of organic substances we have as much energy stored up in it as was required to build it up. Now if

the kinetic energy be not great enough we have not sufficient resistance to keep down the action of these enzymes or acids.

This subject requires the most careful thought and discussion. Some teach that there is no difference between a hard and a soft tooth—that all are the same in their physical characteristics—and yet one cuts easier than the other. We are ready—practically ready—to say that there is a difference in the structure of that tooth. Then what is the difference? It must be in the combination rather than in the quantity of calcium salts.

From my polariscopic observations extending over the last year to determine the crystallization of these organic salts the results promised are interesting, and I feel that we are not getting at the root of the difference of tooth-structure, as we call it at the present time. I believe that if we study the crystallization of the inorganic salts and how their combinations come together it will be of great value.

Dr. J. A. Fischer, St. Louis, Mo. I wish to make a remark as to the nourishment of teeth. In the case of crumbling teeth we are advised to give calcium phosphate. I think no matter how much of the salts we give internally, if they do not enter the animal organism, and are merely eliminated as they are given, they are useless even though we give them by the pound. In order to get results we may take ground bone. I used the shells of eggs ground into a powder and administered for a long time. In the offspring of the persons so treated the teeth have been found to be very strong in structure. If animals do not get the proper food they will suffer from rickets and have cleft palate, as was shown in the "Zoo" in London, where a lioness who was fed on food deficient in these substances had a cub that showed the deficiency, and afterward when her food was changed she had another cub which was perfectly sound.

Dr. M. L. Rhein, New York, N. Y. I have for many years been impressed with the fact that there is a form of caries of the teeth in which this question of the amount of calcium salts taken into the system has a strong bearing. This is a particular kind of caries, I believe. I think it is different from the average form of caries. To make that clear I will call attention to a certain class of immigrants who come to this country, especially from the north of Ireland, where they have been brought up on a diet strong in calcium salts and phosphates. They use oatmeal in a rough state which requires good use of the teeth in mastication, and there is good assimilation of the food products. My experience is that these Irish immigrant girls come here with beautiful strong teeth, but that the teeth soon deteriorate and that rapid caries plays an important part in this. I believe that the change of food they get in this country accounts for this loss of their former immunity to caries. This point is also illustrated in the case of pregnant women, where decay of the teeth occurs in the same way.

What this relationship is scientifically we have not yet demonstrated, but it is easy for us to assert that there is no degeneration of the interior of a tooth—that is, to oppose the views advanced by Dr. E. S. Talbot of Chicago, on this subject; but the falsity of his views has never been demonstrated. His explanation is that the tissues are deprived of their calcium salts and phosphates. We have no right to decry the proposition unless we can prove its falsity. To me its bearing upon the question seems logical, although I admit that no proof of its accuracy has been given. In a pregnant woman who lacks calcium salts and phosphates, the result is seen in a rhachitic child. But it is a most interesting study to see how these deficiencies in enamel formation on deciduous teeth and on the first permanent molars ceases from the moment that the child is subsistent upon its own nutrition. It is to me a most demonstrable fact that the mother lacks the nutrition to form this enamel surface in the child *in utero*.

I want to state a little point in corroboration of Dr. Talbot's theory that

there is a possibility that the teeth of the mother not only are starving for want of these salts, but that they are robbed of their own calcium salts and phosphates to supply this deficiency. This corroboration is found in the clinical observation of the teeth in infantile scorbutus, a condition not often observed. In scorbutus the rapid destruction of the deciduous teeth, their complete annihilation, occurs in a way that can never be accounted for by the condition of the oral fluids or external influences.

These cases are so rare that it is good fortune to be able to observe one. But after having seen a tooth almost disappear in such a case it is impossible to form a rational conclusion upon the process except upon the supposition that there is a retrograde metamorphosis of the inorganic constituents. I know this is contrary to our accepted doctrine, but I can see no other explanation except that nature simply grasps this inorganic material to supply the crying need for it in the bones of the body.

Scientifically I have nothing to offer in corroboration of Dr. Talbot's views on the degeneration of the teeth themselves, but clinical observation seems to me to indorse strongly that theory.

Dr. G. W. Cook, Chicago, Ill. Dr. Rhein said that the deficiency was in the inorganic substances. My opinion is that it is due rather to a deficiency in the activity of the organic substances. It is simply a piece of laboratory work, the building up a tooth-structure.

Dr. Rhein. I want to ask if you have ever seen a case of infantile scorbutus.

Dr. Cook. Plenty of them.

Dr. Rhein. They are not very common.

Dr. Cook. No, I know they are not. For fifteen years my brother has been at the head of a children's sanitarium where we see from twenty-five to fifty children a week in all stages of development and disease. Being a dentist and also interested in the bacteriological work carried on in the institution, I made clinical and bacteriological studies of the mouths of these children. We tried some experiments of increasing the quantity of calcium salts fed to the children. There were public formulas of diets for certain children. But now they begin to study the individual child's diet and foodstuff instead of the diet of all children irrespective of their condition.

Dr. Jonathan Taft read a paper before a Michigan society in which he brought up this question. We had the opportunity of feeding a number of these children, and I asked permission to make a formula in which we increased all the inorganic salts to see what effect it had on the bone and teeth-structures. After four years of observation, one child that seemed to have the best nutrition of any of them, so far as organic substances were concerned, had the poorest teeth and after a little time developed rickets and is now unable to get around; it is lodged in bed and kept so that its legs and arms may not become distorted. I am fully convinced from a clinical and scientific standpoint that the power behind it all is of an *organic* nature, and that the teeth will take up only a certain amount of calcium salts, and that the condition is due to the physical arrangement of the inorganic compounds—not so much the quantity as the arrangement of the crystallization.

Dr. Rhein. Then you make the point that the basic organic substance is lost in these cases, leaving the inorganic substance unprotected?

Dr. Cook. No, it is a question of deposition. We may stimulate the pneumogastric nerve and produce an effect on digestion. Then, owing to the lack of proper digestion and assimilation the inorganic salts are not carried up to the tooth so as to be deposited there. When a disturbance such as pregnancy occurs it possibly changes the organic structure. The basic matrix of the tooth is organic. Now the disturbance does not cause the disintegration, but it changes the molecular arrangement of that salt so that it is more easily broken down. The energy has been changed from a potential to a kinetic energy, operating to destruction rather than to stability.

Dr. Rhein. You admit that there are

conditions due to absolute lack of phosphatic and calcium nutrition?

Dr. Cook. I do not believe I would admit that, because we fed these children a superabundance of that food. Some time I may have to take back what I have said. But in certain acute infectious diseases, such as diphtheria and scarlet fever, we observed a lack in the formation of enamel; when the child has the disease before the eruption or during formation of the teeth, ridges and grooves will be seen. Whether the teeth contain the proper quantity of inorganic salts or not I am unable to say.

Dr. Rhein. I differentiate very decidedly between the markings formed in life and those formed *in utero*. One shows the evidence of some nervous effect on food assimilation. But I do not grant the same for the enamel defects on the deciduous teeth and those found on the enamel of the first permanent molars.

Dr. Cook. The investigations have not been carried on sufficiently to determine whether we have a lack in quantity of calcium salts in different teeth. Dr. Hinkins and myself tried to determine the difference in the quantity of calcium salts in teeth weighing the same, but we got so deep in the subject that we did not carry it to any extensive conclusion. It was Dr. Black's investigations that led us to take this question up.

Dr. Rhein. Dr. Miller substantiated your view yesterday, I think.

Dr. Cook. Yes, I think it is in the arrangement of the inorganic constituents rather than in their quantity.

Dr. Herrmann Rauhe—translated by Dr. Fischer (closing the discussion). I do not agree with Dr. Black. It is not the relative question of the deposition of calcium salts upon which caries depends, but with the relative nutrition in general. Naturally that organ which is the least nourished will be the least important for that particular organism. Therefore, animals not sufficiently supplied with these salts show the lack first in the bones. It is different with the human being. Man excels principally because his bony structure is of the highest development, and his intelligence depends largely upon the complete structure of the bones. Therefore in Dr. Miller's experiment the bones were affected before the teeth. In a human being the teeth will suffer first.

There being no further business before the section, the Chairman declared Section II adjourned until the next congress.

SECTION III: Chemistry and Metallurgy.

Chairman—Dr. J. D. Hodgen, San Francisco, Cal.
Secretary—Dr. J. P. Buckley, Chicago, Ill.

First Day—Tuesday, August 30.

The section was called to order at 2.30 p.m. by the chairman, Dr. Joseph D. Hodgen, San Francisco, Cal.

The Chairman. It is very gratifying to me to meet those present. I am greatly pleased to have so much interest shown in the Section on Chemistry and Metallurgy. Dr. Buckley and I have worked hard to make the meeting of this section a success, and though the program is short I feel confident it will be worthy of your attention. I have prepared a paper on the relation of chemistry to dentistry, and while this may be presented more particularly from the standpoint of a teacher of chemistry than from that of the practitioner of dentistry, yet I trust that every scientific practitioner will find something of interest in it.

Dr. Hodgen then read a paper on "Chemistry and Dentistry," as follows:

Chemistry and Dentistry.

Gentlemen, it seems fitting at this time, the opening of the Section on Chemistry, to briefly discuss the rela-

tionship of this science to the more composite science and art of dentistry, in which we cannot fail to observe chemistry playing a very important part.

The study of modern chemistry presents many phases, but in its simplest classification it is *pure* or theoretical, and *applied* or practical. Theoretical chemistry has to do with the laws governing chemical changes, while applied chemistry treats of the application and economic relation of chemistry to the arts and industries. Accordingly we find among its many applications medical, metallurgical, pharmaceutical chemistry, etc.

In medical education of today and in the advancement of medicine as a science and art its technical chemistry has kept abreast with, if not in advance of, the numerous other subjects which go to make up a complete medical training. In metallurgy and in pharmacy, chemistry is the most important science, and in these its application has most marvelously advanced their respective fields of service to art and to mankind.

In a general way the application of chemistry to medicine and to pharmacy varies greatly. It might be said they are diametrically opposed: medical chemistry is essentially analytic, pharmaceutical chemistry is largely synthetic. In the one the physician depends greatly upon his analytic examinations of excretions, secretions, and tissues for his diagnosis. In the other the pharmacist has developed his stock of remedial agents, etc., by building up new and imitating natural products.

The instructors of chemistry in dental schools have, almost invariably, been drawn from the ranks of pure science, from medicine, or from pharmacy, instead of from our own profession. The result of this is most unfortunate: unfortunate in that such a procedure is a mere makeshift, and that it tends to retard, if not entirely prevent, harmonious methods in the teaching and systematic application of the science. Teachers taken from other professions, no matter how closely those professions may be allied to dentistry, cannot have more than a secondary interest in the work required of them. They are, therefore, generally induced to undertake the instruction of dental classes solely for pecuniary returns, and very naturally give in return for their salaries a mere perfunctory service dictated by a faculty which oftentimes has no conception of the requirements, benefits, or methods of instruction in chemistry, the teacher having been selected solely upon a reputed general knowledge of the science. Such lack of interest in the good of the dental profession or its advancement, on the part of those chosen as instructors of dental classes, is an unquestionable misfortune They are never, or are rarely ever, in attendance at dental meetings, and consequently conferences so essential to harmonious methods of teaching or systematic advancement of the application of this science to dentistry are practically unknown. The absence from our associations of such as are qualified—for the fact is that few dentists are sufficiently familiar with the science of chemistry to scientifically discuss dental subjects from a purely chemical standpoint —is not appreciable to many because the benefits of such discussion are unknown. Moreover, in that such instructors are to be had and are pretty generally employed, there is little or no incentive for the dentist who might desire to fit himself as a teacher of chemistry, to do so under such uninviting circumstances. The real and consequent misfortune of such instruction, or lack of instruction, lies in the fact that the opportunity for a proper application of this science to dentistry has been so greatly delayed that at this advanced time dentistry has no real application of the science of chemistry sufficiently technical to be termed "dental chemistry."

I trust the statements I have made relative to instructors in chemistry to dental classes will not be misconstrued. It is not my desire to disparage the efforts of those engaged in such instruction, for although dentistry has egregiously erred in not developing its own chemistry, these men have performed yeoman service for the profession which

it would not do for itself, and in all probability dentistry would have been in a sad state had it not been for their services.

Nor do I wish to disparage the noble efforts of those very few who have sought to give to the profession a text-book on dental chemistry. Theirs have been steps in the right direction and they have done their work as well as possible.

If the profession must have instruction in chemistry from one of these outside sources it is probably better that it be secured from the pure scientist. Then, if the inclination or talent for original work be inherent in the student, he will receive a foundation upon which he may build without the handicap of having been taught a science as applied to an art other than that for which he is preparing himself. If practical medical chemistry or pharmaceutical chemistry are, as basal studies, antipodal, which I believe they are, however auxiliary they may practically become, then it is only logical to conclude that one, the other, or either is not suited to dental education.

It is not expected nor is it necessary, that every student graduated from a dental school shall be a practical chemist. The requirements of the dental practitioner do not demand it. But it is expected that the dental graduate is sufficiently informed in theoretical chemistry to be able to see the application of this science to his profession; to read intelligently explanations of phenomena encountered in routine practice, and to appreciate the properties possessed by the various materials he is called upon to use in that practice. Such an understanding of the science of chemistry, I believe, can very rarely be had from teaching in medical or pharmaceutical chemistry, especially since the present entrance requirements to dental schools fails to make a knowledge of theoretical or pure chemistry an essential. To teach a dental student who is unacquainted with the pure science the application of that science to medicine or pharmacy—and it is done many times in mixed classes—is time lost, worse than lost. The unfortunate student is not only unable to comprehend that which is being taught, but moreover, as has already been hinted, being taught another application of the science he loses sight of any dental application he might otherwise deduce from the pure science.

I repeat, and with profound regret, dentistry today has no technical chemistry. If it had, text-books on medical and pharmaceutical chemistry would not be used for instruction in nine out of ten colleges of our country. Having no dental chemistry, no chemistry as such can be taught. But a dental chemistry can be developed if the colleges will accept teachers of this science from the ranks of our own profession. There are many dentists who are acquainted with pure chemistry, and of these some may be found who, having the talent and the application, may make most competent teachers and who will apply the science practically wherever and whenever it can at present be applied. The eventual result will be a *dental chemistry*. Such an application, however, cannot be the product of one mind, nor indeed of one generation, but is to be had only through rational development here, as has been the case in all arts and industries. If such a course was followed by our schools logically, a greater interest in the science and its dental application would be manifested by the students of dentistry, and the benefits of chemistry would be greatly increased. As an art, the progress made by dentistry in the span of a single human lifetime, has been the marvel of an appreciative laity, but its continued progress now demands the helpful assistance which scientifically applied chemistry alone can give it.

The dentist of today needs to have a fair knowledge of the facts and the phenomena presented by the science of chemistry, and he needs this knowledge applied to dentistry. The dental teachers of our day need to much more fully and more generally understand that chemistry is one of the most important fundamental sciences upon which the art of dentistry is builded.

That the dentists of the future may

be acquainted with these facts and phenomena of chemistry, the students of today must be furnished with a good text-book on inorganic, organic, and physiological chemistry, for diligent study, and a competent instructor to explain and elaborate it. But above all there must be provided a thorough laboratory course to demonstrate and fix in the mind the facts learned.

Merely memorizing facts, however, is of small value. Indeed, overloading the memory with facts, like overloading the stomach, may defeat mental digestion. It is not the knowing a great many things, but the knowing how to use to the best advantage what one knows, that most avails. We should learn to marshal our knowledge to good purpose—should learn rather to reason than to merely think. Doing must accompany thinking or there will be no power of execution. Mental vigor of any kind is gained, not by memorizing or through professors, but by mental self-help, which utilizes the knowledge as it is acquired. We grow in power by investigation, deep concentration, thinking, planning, and bringing about results without the assistance of others. One self-wrought problem will give more vigor than a thousand worked out for us. Someone has said, "It is the constant stretching of the mind over large problems, over models—it is independent thought that increases mental power."

Too much so-called chemistry is taught today which practically consists of tabulated facts respecting the various substances known. No science can be intelligible when the facts and phenomena are separated from the theories which systematize and arrange them. Indeed, science is but the orderly arrangement of facts in a rational system. Obviously, then, it is eminently essential in the study of a science to distinguish facts from theories. Facts alone can be regarded as absolute knowledge. They are actual and immutable. They are the imperishable stones of which the structure of science is builded, and are the gift of God to man. Theories at best are only man's explanations of facts. Imperfect, then, as they must be, they are liable to constant change, and subject to limitations in development. They are, however, the means of binding the stones together, giving symmetrical form and systematic arrangement to the structure. The form of the edifice may be changed or altered, torn down or destroyed, but the stones remain, and from them a new and more perfect structure may be erected.

The theory of a science cannot properly be separated from the history of that science. A retrospect of the past, especially in exact sciences, alone affords a proper comprehension of what is accepted today. It is only when we are acquainted with the theories which preceded those accepted at present, that the latter can be fully understood, because there is almost always an intimate connection between them. But, apart from this real advantage of the study of history, which thus in my opinion leads to a clearer understanding of the present position, another advantage yet may be adduced which is perhaps of still greater value to the student, namely, the accurate estimation of the value of theories. Further, by the study of history our faith in authority is diminished, which faith produces pernicious effects by obstructing the way for original development of the individual. On the other hand we also learn, it is true, that theories are necessary for further development, and that, although the actual teachings of science may lie in the facts, their real intellectual significance can only be acquired by connecting isolated observations by means of hypothesis, so that the present position consists far more in the mode of explaining observations than in the observations themselves.

I dwell thus upon the value of the theory of chemistry for two reasons: First, because it is so essential to the comprehension of the real science and its proper application; second, because I have observed it so greatly neglected, not only in the dental curriculum, but also in preparatory schools.

Dentists as teachers of chemistry in dental schools cannot all hope to be

original investigators as well, for in most instances the time taken from practice for the purpose of study and teaching precludes the allotment of additional time for investigation, even if the ability and inclination served. But the practitioner having a bent for investigation, and a technical dental chemical education, will be the real Moses to lead the profession out of the darkness in which it has long been groping, as far as investigations along chemical lines are concerned.

The profession is clamoring today for help in plastic filling materials, especially in cements, in porcelains, etc., and that at the hands of simple inorganic chemistry, though this may not be realized by all. It is demanding more knowledge for progress in antiseptics, disinfectants, germicides, obtundents, anesthetics, and remedial agents. Its knowledge of these is merely empirical and unscientific. It is absolutely benighted in physiological and pathological knowledge of dental tissue and oral secretions, upon which dental chemistry could shed the light of noonday. It is, or will be, without dental chemistry, at a standstill in its advancement in dental bacteriology, histology, technics, physiology, pathology, metallurgy, etc., compared with what it would be with an up-to-date dental chemical education.

Dentistry has never accepted from chemistry anything like the assistance that science can give. Chemistry in dentistry has never been given the attention it deserves. Dentists, as a rule, have less knowledge of chemistry than of any other subject allied to dentistry. There is an astonishing lack of dental chemical literature. We will, however, hope for something better in the future; we will hope for a real application of chemistry to dentistry, sufficiently technical to be known as *dental chemistry.*

Discussion.

Dr. J. P. Buckley, Chicago, Ill. There is no doubt that the essayist is right when he refers to the unfortunate condition that exists in our dental colleges—*i.e.* that the men selected to teach chemistry to our dental students in most instances are not dentists. I have said before, and often, that if there be any one subject that should be taught to the students in our dental colleges, it is the subject of chemistry; because no one without a knowledge of chemistry is able to apply that science to the practice of dentistry. It is absolutely impossible for the medical man, or the pure scientist having no knowledge of the practice of dentistry, to make this subject interesting and pleasant to the dental student, whereas on the other hand it can be done even though the dentist's knowledge of chemistry be less than that of the medical man or the pure scientist.

It is to be regretted that we have no text-books on the subject of dental chemistry. This is also true in regard to other subjects; we need text-books on other dental subjects, such as materia medica, etc.

Dr. Alfred Owre, Minneapolis, Minn. Dr. Hodgen and I have always agreed on these high ideals, and how the subject of chemistry ought to be taught in dental colleges; consequently I have no points at issue with him, and am very much in the same plight as Dr. Buckley; as long as we all agree we can do nothing but commend the paper. We all recognize the importance of the subject. The pure scientist can admirably teach the science of chemistry; he cannot, as a rule, apply it to the subject of dentistry. It is the hardest kind of work for me to get even some slight advice from my chemistry teachers as to its special application to some question of practice in dentistry. The only way I can arrive at a conclusion in regard to some problem involving the application of chemistry to dentistry is to work it out myself; I get very little assistance from the scientist who is teaching chemistry.

Dr. A. W. Harlan, New York, N. Y. One of the strong arguments in favor of a four-year course in dental colleges would be the absolute and thorough instruction of the dental student in the science of chemistry; I do not mean in dental chemistry, I mean in chemistry as

a science itself. If a man be thoroughly grounded in chemistry it does not matter so much whether he gets it from lectures or from demonstrations, but he must do a certain amount of laboratory work in order to familiarize himself with the basal principles of that science. I think that if a student could listen to one or two didactic lectures per week, and work six or eight or ten hours per week in the laboratory, when he did get into the second or third year he would begin to understand some of the things that the lecturers were talking about and which he could not understand if he did not have that practical experience. So I wish to commend the paper, in particular, on account of its advocacy of a strict and prolonged period of study in chemistry, which is one of the three basal subjects that we have in dentistry.

Dr. J. S. Cassidy, Covington, Ky. We may have a knowledge of chemistry, a great deal of knowledge; we may have a thorough knowledge of its fundamental principles and their application—of pure science as well as of applied science; but we may make mistakes in the therapeutic application of that knowledge. We know very well that the application of an alkali will destroy an acid, and we have gone on for years in the use of alkaline treatment for diseases of the mouth; but there are other conditions and effects of the treatment that must be taken into account besides merely the acid condition of the mouth. If we have uric acid in the body we neutralize that by giving an alkali; but physiological chemists tell us the more alkali, the greater the tendency of the system to develop more uric acid. In the mouth, acid is developed by fermentation; we know that an alkali will destroy that acid; that is a chemical fact —it cannot be disputed. But when we apply that alkali, one of the conditions favorable to the development of the acid in the mouth is established; we thus encourage the growth of acid-forming bacteria. That kind of bacteria do not thrive very well unless they have either a neutral or an alkaline medium. One of the factors causing dental caries is bacteria; they precede the formation of acid, and when we use an alkali it is with the result of preserving the lives of those very creatures necessary to form the acid. Is that good treatment? I should think not, and yet it is a question that has never been raised before that I know of. It has been taken for granted that because acids destroy the teeth we must use alkalies as a preservative of the teeth.

The Chairman then called on Dr. J. P. Buckley, Chicago, Ill., who read the paper which here follows:

The Chemistry of Pulp-Decomposition; with a Rational Treatment for this Condition and its Sequelæ.

The subject of pulp-decomposition is one that has commanded the attention of many investigators in our profession, and, at the present time the conclusions as to the chemistry of the process are many and varied. Until we comprehend more fully the nature of the chemical reactions taking place in the splitting up of the complex bodies of dead pulp tissue and have a more definite knowledge of the end products thus produced, the application of drugs and remedies for the correction of the putrescent condition and the restoration of the color of the tooth-structure can never be placed on a rational basis, but must be empirical, as it has been in the past. This is not in accordance with the tendency of this age, either in medicine or dentistry.

As pulp-decomposition and its sequelæ is a subject in which every practicing dentist is vitally interested, it should be our endeavor to establish a rational treatment for this condition. In order to accomplish this, it is necessary that we study the chemistry of this process and thereby gain an intimate knowledge of the end products resulting therefrom. It has never been shown that the pulp tissue differs in any particular essential, so far as the chemical constituents are concerned, from the other tissues of the body; therefore your attention will be directed briefly to the chemical composition of animal tissue.

There are at the present time about seventy-six elements known to chemistry, but of this number less than seventeen unite, in varying proportions, to form the chemical basis of the animal body. In fact, six elements are about all with which we are concerned in the study of the decomposition of the pulp tissue. These elements are carbon, C; hydrogen, H; oxygen, O; nitrogen, N; sulfur, S; and iron, Fe.

For convenience in study, the various substances found in animal tissue are divided into two general classes, the classification being based upon the presence or absence of the element nitrogen, and are called nitrogenous and non-nitrogenous substances.

NITROGENOUS SUBSTANCES.

We are taught by physiologists that nitrogenous organic bodies take the chief part in forming the solid tissues, and to an extent are also found in the fluids of the body. Proteid or albuminous substances are the principal nitrogenous compounds, and one or more enter, as an essential part, into the formation of all living tissue. The elements which constitute the proteid molecule are carbon, hydrogen, oxygen, nitrogen, and a small amount of sulfur. Phosphorus has also been known to exist. While some chemists have attempted to construct a formula for the molecule, none has been accepted as correct, the opinions of investigators being so varied. To the casual observer it may seem strange that a molecule consisting largely, as it does, of carbon, hydrogen, oxygen, and nitrogen, should have these four simple elements so arranged as to baffle chemists in their efforts to construct a rational formula. But this is not a difficult thing to understand when we know that of all the elements none differ more widely from each other in their physical and chemical properties than these four.

Carbon is a black, solid substance, which can scarcely be fused or volatilized. Hydrogen, oxygen, and nitrogen are colorless gases, which cannot be solidified by any known means, and can be converted into liquids only with difficulty. The three gases also differ in their chemical activity. Hydrogen is combustible; oxygen will not burn, but will support combustion; while nitrogen is perfectly indifferent. Fortunately, too, for nature, in her effort to arrange these elements into a complex molecule, the valency of each differs. Hydrogen is univalent, oxygen bivalent, nitrogen trivalent, and carbon quadrivalent, generally considered. Carbon atoms have also, to a higher degree than the atoms of any other element, the power of combining with one another by means of a portion of the affinity possessed by each atom, thereby increasing the possibilities of the formation of complex compounds. Thus many atoms of the same element occur in each molecule, which, together with the fact that one of the elements is that peculiar, undecided and indifferent nitrogen, aids materially in explaining the reason for the instability of the proteid molecule, or the ease under certain conditions with which it is decomposed.

NON-NITROGENOUS SUBSTANCES.

The non-nitrogenous substances consist of carbohydrates and fats. Several classes of carbohydrates are known to exist, all of which are much less complex than the proteid group; and the arrangement of the atoms in the molecule is much better understood. The carbohydrate molecule is composed of three elements—carbon, hydrogen, and oxygen. There are always six (or a multiple of six) atoms of carbon in the molecule, while the hydrogen and oxygen exist in the proportion to form water. These compounds readily undergo the process of fermentation.

Human fats are principally mixtures of palmitin, $C_3H_5(C_{16}H_{31}O)_3O_3$, stearin, $C_3H_5(C_{18}H_{35}O)_3O_3$, and a small amount of olein, $C_3H_5(C_{18}H_{33}O)_3O_3$. As shown by the formula of these compounds, the molecule of each consists of carbon, hydrogen, and oxygen. The proportion of these elements varies in the different compounds. That fats are de-

composed or saponified by alkalies, or ferments in an alkaline medium, should be remembered both in the treatment and the bleaching of teeth.

Thus we have every reason for believing that the pulp tissue, like nearly all living organic tissue, is composed of proteids, carbohydrates, and fats. On this hypothesis, then, we will endeavor to ascertain the final products resulting from the decomposition of this tissue.

FERMENTATION AND PUTREFACTION.

Before doing so, however, it may be well that we have a clear understanding of what is meant by the terms fermentation and putrefaction. These terms are applied to peculiar kinds of decomposition by which the molecules of certain organic substances are broken up into simpler compounds. The difference between the terms is that fermentation is applied to the decomposition of those substances which belong to the group of carbohydrates, while putrefaction is applied to the decomposition of those substances which properly belong to the proteid group, and are classified as nitrogenous substances.

PULP-DECOMPOSITION.

The decomposition of the pulp tissue is essentially an analytical process, which takes place gradually. Through the agency of micro-organisms these complex bodies are broken up into simpler and well-known compounds. That is to say, the micro-organisms first act upon these complex and unstable substances, splitting them up into less complex compounds—which, however, are capable of further analysis, and the process goes on, conditions being favorable, until the decomposition is complete.

The desire to acquaint myself with the nature of the reactions taking place in this process has led me to do much investigating along this line during the last few years; and I state here, without any hesitancy, that the chemical reactions taking place in the pulp-chamber and root-canals of teeth containing pulps undergoing the process of decomposition cannot be duplicated in test tubes in the laboratory. This study and thought, however, has caused me to come to the following conclusions, which I believe will agree with the clinical experience of every careful observer.

I believe that the initial process in the decomposition of the pulp tissue is one of *fermentation,* which is brought about by the action of micro-organisms upon the carbohydrate constituents, producing among other compounds such acids as carbonic, H_2CO_3 (H_2O+CO_2), and acetic, $HC_2H_3O_2$, depending largely upon the micro-organisms present in the tissue. This creates an acid medium which favors the action of those micro-organisms, here ever present, which have the power to decompose the complex proteid molecule in such a medium, and the process of *putrefaction* is thereby inaugurated. Among the first products produced are hydrogen sulfid, H_2S; putrescin, $C_4H_{12}N_2$, and two isomeric substances, cadaverin and neuridin, $C_5H_{14}N_2$. As the process goes on, these latter substances are gradually broken up, and ammonia, NH_3, or derivatives of ammonia, are evolved.

I have been led to believe, also, that the fatty constituents remain practically unchanged in the entire fermentative and putrefactive processes, and that they exist in the putrescent mass of a pulp-chamber and the root-canals. The bacteria may split up neutral fats into glycerin and fatty acids, but other than this no change seems to occur. Every chemist is familiar with the fact that carbohydrates are unstable compounds; that they readily undergo the process of fermentation; and that neither an acid nor an alkaline medium is essential for the action of the exciting agent, whether it be a ferment or a micro-organism. It is also well known that proteid substances are easily putrefied by micro-organisms in the presence of the proper temperature, moisture, and an acid medium—all of which are present in a pulp-chamber after the process of fermentation has begun. That fats are emulsified or saponified by alkalies, or

ferments in an alkaline medium, is also a well-established fact. Such a medium, I believe, in the pulp-chamber of a tooth never exists from the time the fermentative process begins until the putrefactive process is complete.

THE END PRODUCTS.

It is well to remember, then, that early in the process of pulp-decomposition the carbohydrate and proteid or albuminous constituents are decomposed, and that the chief final products are water, carbon dioxid, ammonia, acetic acid, and a semi-putrid substance which, for reasons mentioned, I believe is largely composed of fats, depending upon the extent to which the process of decomposition has progressed. It should be remembered, too, that simultaneously with the breaking up of the pulp tissue the dentinal fibrillæ are also decomposed, and that the dentinal tubuli, as well as the pulp-chamber and root-canals, are filled with the end products of the decomposition, together with little globules of fat or fatty acids.

Having stated what seem to me to be the chief final products of pulp-decomposition, and therefore the compounds with which we have to contend in the treatment of these cases, I beg permission to direct your attention to this phase of the subject:

COAGULATING AND NON-COAGULATING AGENTS.

Those of you who have read the literature of our profession for the past ten or fifteen years know that the opinions of many investigators in regard to the penetrating or non-penetrating power of coagulating agents in a putrescent root-canal are many and varied. The reason for this variance of opinion I have never been able to understand. Many of the leading men of our profession have objected to the use of coagulants in the treatment of putrescent pulps and abscesses without a fistulous opening, for the reason that such agents will, in their opinion, coagulate the albumin present and thereby prevent their penetrating the contents, and that the coagulum is also liable to close the small root-canals. On the other hand, there are many who assert that albumin, though present, does not prevent the penetration of coagulating agents, and that such take place throughout the pulp-chamber and root-canals as well as the dentinal tubuli. Both sides attempt to sustain their theories by many laboratory experiments. Those who object to coagulants in the treatment of these cases adduce the coagulating action of such agents upon the albumin of a fresh egg. But the conditions here are not at all similar. Should an egg which has undergone the process of decomposition be substituted for a fresh egg it will be noticed that no coagulum is formed—for the simple reason that the proteid constituents (coagulable material) have lost their identity by chemical decomposition, and new compounds with entirely different properties have been formed. This explains, too, how the advocates of the penetrating power of these agents have seemingly succeeded in sustaining their theory. It has been shown that coagulating agents, in contact with egg albumin in sealed capillary tubes, penetrate the entire mass; and that the action of these agents is self-limiting only up to the quantities used. By sealing these agents in extracted teeth with the cementum removed and embedded in plaster, it has been shown also that they penetrate the entire tubular structure. These experiments prove conclusively that coagulants will penetrate the putrescent mass of a root-canal, but do not prove, to my mind, that albumin as such is here present. I am not anxious to antagonize either side in this controversy, but it is a subject, as I have previously mentioned, in which every practicing dentist must be interested, and yet one which seems never to have been successfully settled. It seems to me, therefore, that we should not be over-anxious to criticize each other's views, but each should study the chemistry of pulp-decomposition and thereby acquire a knowledge of the chemical facts relating thereto. It is by this

method only that this subject can be scientifically mastered.

A RATIONAL TREATMENT.

In selecting drugs, then, to be used in the rational treatment of these conditions, I shall eliminate the question of coagulation, and select agents with reference only to their ability to unite chemically with the end products resulting from pulp-decomposition. In this connection we should remember that the putrescent condition has been brought about through the agency of micro-organisms by a gradual analytic process; that many of these germs are pathogenic in character; and that among the first products of importance are hydrogen sulfid, putrescin, cadaverin, and neuridin. The last-named compound, being non-infectious, is of little importance, other than to know that it is a nitrogeneous substance from which ammonia is evolved by further putrefaction. Still, according to Vaughan and Novy, while pure neuridin is non-poisonous, it possesses a toxic action as long as it is contaminated with other poisonous products of putrefaction. This holds true for all non-poisonous bases. Hydrogen sulfid is important because it is an *acid gas* with a disagreeable odor, having local irritant properties, and also because of the part it plays in the discoloration of the tooth-structure. However, I must say here, that while I realize that hydrogen sulfid is an active chemical agent, in my opinion it has been greatly over-estimated in the rôle it assumes in the discoloration of teeth from the decomposition of the pulp tissue. Putrescin and cadaverin are perhaps the most important compounds, in so far as the correction of the putrescent condition is concerned, known to be formed in the splitting up of the proteid molecule. Like neuridin, they are basic nitrogenous compounds, capable of undergoing further putrefaction, evolving ammonia; but, unlike this compound, while they were at first regarded as physiologically inactive, both these bases have been proved by Scheurlen, Grawitz, and others to be capable of producing inflammation and necrosis.

Among the gases produced, then, in pulp-decomposition are carbon dioxid, ammonia, and hydrogen sulfid. As these gases are evolved in those cases where there is no free exit from the pulp-chamber through a cavity, pressure is produced, and in many instances they escape through the apices of the roots, carrying the poisonous ptomains into the surrounding tissue; inflammation is thereby produced and an alveolar abscess established.

In those cases where we open into the pulp-chamber and find a pulp undergoing the process of decomposition, and when the ptomains and end products have not been forced through into the apical tissue, our treatment should be to at once *hermetically* seal into the pulp-chamber an agent which is volatile and thereby penetrating, and which, as it comes in contact with the end products, will unite chemically, converting them into odorless and non-infectious compounds. Such an agent we have in formaldehyd, CH_2O, a gas which occurs in commerce in a forty per cent. aqueous solution known as "formalin."

It has long since been known that ammonia is one of the chief end products in the splitting up of the proteid molecule. It is also known that formaldehyd unites with ammonia to form a solid compound, which is odorless, colorless, and has a sweetish taste, known commercially as urotropin, chemically as hexamethylene-tetramin, with the chemical formula $(CH_2)_6N_4$. It is stated also on good authority that formaldehyd unites chemically with hydrogen sulfid and basic ptomains, forming inodorous compounds. Formalin, however, is too strong a solution for our general use; therefore, believing that the fats remain practically unchanged in the process of decomposition, I have been using cresols, in combination with formalin, which act chemically upon the fatty constituents. Cresols are homologues of carbolic acid. There are three—metacresol, orthocresol, and paracresol. The product best suited for our use is *tricresol,* a refined mixture

of the three. It is a nearly colorless liquid, of a creasote-like odor, and is soluble in water to the extent of 2.5 per cent. Tricresol has been selected as the vehicle with which to dilute formalin for three reasons:

(1) It is miscible with formalin in all proportions, thus making a good pharmacal product.

(2) It is a good germicide—nearly three times as powerful as carbolic acid.

(3) It acts chemically upon the fatty constituents, thereby properly disposing of these substances.

The formula which I have been using with gratifying results in the treatment of putrescent pulps is—

A

℞—Tricresol,
Formalini, āā f℥j (gm. iv). M.

Sig.—On a small pledget of cotton, hermetically seal in the pulp-chamber from twenty-four to forty-eight hours. One treatment is generally sufficient.

In the treatment of abscesses without a fistulous opening it is well to modify this formula. In these cases the decomposition of the pulp tissue is complete. The intermediate products (ptomains) have largely been broken up, pus has been formed from the tissue surrounding the ends of the roots, and the first step in treating such an abscess is mechanically to evacuate the pus. We have no necessity for using formaldehyd, then, in the same strength solution as in those cases where the pulp-chamber, root-canals and tubuli are filled with the putrescent material. The point I desire to impress is that formaldehyd in this strength solution *must* be confined to the tooth-structure, for it is one of the most irritating agents known to the therapeutist. A safe formula for abscesses without a fistula is—

B

℞—Tricresol, f℥j (gm. iv),
Formalini, f℥ss (gm. ij). M.

Sig.—Mechanically evacuate the pus and, on cotton, hermetically seal in the canals from twenty-four to forty-eight hours, two or three times—oftentimes one treatment is sufficient.

EXPERIMENTS.

(I) Add to 5 cc. of strong ammonia water 3 cc. of formalin. A violent reaction takes place, forming urotropin $(CH_2)_6N_4$, which dissolves in the water:

$$4NH_4OH+6CH_2O=(CH_2)_6N_4+10H_2O.$$

The clear solution is evaporated, using moderate heat during the last stages of the process, when the urotropin is obtained as a white, crystalline solid.

(II) Pass a stream of hydrogen sulfid into 5 cc. of formalin for a few seconds. The odor is at once destroyed. This proves that a reaction takes place. I hold that methyl alcohol, CH_3OH, is formed, and sulfur is liberated:

$$2CH_2O+2H_2S=2CH_3OH+S_2.$$

On evaporating the solution to dryness, the methyl alcohol burns, leaving the sulfur, S, as a residue.

Tricresol, besides its germicidal power, dissolves the fatty globules which, if treated with alcohol (as is usually done in drying the canal) produces *lysol,* a good antiseptic. It is plain to be seen, then, that the poisonous gases and liquids resulting from pulp-decomposition are converted by the proper use of formaldehyd and tricresol into non-poisonous liquids and solids which are themselves antiseptic and germicidal in character. How can we imagine a more thorough sterilization of the dentin than to chemically produce within this tubular structure substances which possess these properties?

Thus I feel justified in speaking of the use of this remedy as a *rational* treatment for the conditions under consideration. Marvelous results are obtained, and at the same time we know why.

It should be remembered that the formulas given are for general use. The practical dentist will soon find that it may be best to vary the proportion of the ingredients of the mixture according to the case at hand. One great advantage in using remedies containing formaldehyd is that the medicament must be hermetically sealed in the tooth in order to obtain the best results. This prevents

the saliva from contaminating the medicine within the tooth, and the medicine from contaminating the saliva in the patient's mouth.

The use of neither formaldehyd nor tricresol alone is original with the writer. I have studied the action of drugs, trying to place the treatment of these conditions upon a rational basis, and am gratified to know that such has been accomplished by the combination of formalin and tricresol in the manner which I have suggested.

In conclusion, I desire to say that many of the statements made in this paper are based upon well-established chemical facts; therefore I cannot lay much claim to originality. However, I have endeavored to make a correct application of the chemical principles involved. The theory in regard to the decomposition of the pulp tissue may seem, perhaps, not to have been scientifically demonstrated; but it is the result of my laboratory investigation, and also is in harmony with my close clinical observation. As such, I present it to you for your consideration.

Discussion.

Dr. A. W. Harlan, New York, N. Y. The subject of pulp-decomposition and the handling of pulpless teeth are subjects that have engaged the attention of the dental profession for a great many years. Since the discovery in 1836 by Spooner that arsenic would destroy the pulp of a tooth (although it was known many years before that the pulps of teeth could be destroyed by the action of cauteries, or destroyed by the use of corrosives and the invasion of caries, and perhaps by other means), we have had an absolute universally reliable adjunct through which a pulp could be destroyed. Running along from 1836 to 1890 or thereabouts the methods of handling the pulp were various. At that time was presented the proposition of Schrier of Vienna, the kalium-natrium process for the treatment of infected root canals. According to that method the pulp tissue was to be saponified and removed, and during the process of saponification nothing would happen. According to the researches of Frey, Boll, G. V. Black, Caush of Brighton, Eng., and Choquet of Paris—I don't know whether I can include Miller in that list or not—they did not discover that there were lymphatics in the pulps of teeth or that there was fat. If the process of Schrier for the saponification of pulps was based upon the theory that there were fat-globules in the pulp tissue—and the microscopists, such eminent men as I have mentioned, have failed to discover that there was any fat in the pulp—then what becomes of the theory of Schrier? It may be that there is fat in the pulp, and it may be that there is some fat to be saponified—I am not enough of a microscopist to determine it for myself; I have not made any sections of pulp tissue or made any analysis of pulp tissue to discover wh ther there is any fat in the pulp tissue or not. Dr. Buckley says in his paper that he has not been able to discover that pulp tissue differs in any way from animal tissue elsewhere.

Dr. Buckley. So far only as the chemical constituents are concerned.

Dr. Harlan. Yes; that is, if by synthesis the chemical constituents will produce fat, then we have a synthetic fat, just as we are able to produce synthetic carbolic acid, C_6H_5HO. It is true that we can get a synthetic carbolic acid that does not have a red color, especially if produced in vessels that are only glass. Now, if any process for a treatment of putrescing or putresced pulp be based on the fact that there is fat in that pulp, then the fact of its presence in the pulp must be demonstrated. I do not say, mark you, that there is not any fat; I am only quoting these gentlemen who have investigated that subject.

Dr. Buckley's presentation of this subject, so far as I know, with reference to formalin, putrescin, and neuridin is in consonance with Aitken's "Animal Alkaloids" and Klein's "Micro-organisms," both of which works I have had occasion to consult, not recently but in times gone by. We all think we are making great progress, but you must remember that it

takes years to demonstrate a thing. As Dr. Cassidy said a little while ago, we have to rearrange our views. I remember very well it was thought formerly that all you had to do was to open into a putrescent pulp and put a little carbolic acid in there, and that was all. Or, if that were not done, some iodin and creasote were applied and that was considered all that was necessary. Now we know, as Dr. Buckley has clearly demonstrated, that after the decomposition of the pulp takes place, there is no albumin in the pulp-chamber—there is only albuminous matter in the pulp itself before the decomposition has taken place; and so if carbolic acid, creasote, or zinc chlorid be applied shortly after the death of the pulp and before decomposition has begun, it can coagulate and shrivel it, and perhaps if the agent be powerful enough it may convert it into an ash and incinerate it, perhaps absolutely destroy it. But the men who have been working on those conditions have been mistaken. A coagulating material will not coagulate something that is not coagulable. Dr. Buckley has made that clear.

Dr. Truman presented a series of experiments in Philadelphia in 1894 to prove that a coagulating agent would absolutely penetrate everything. I took the trouble to take twenty or thirty or fifty freshly extracted teeth and drop them into a solution of silver nitrate and leave them for a month, and I found on examination only a surface coagulation, because there was an absolute pericemental membrane surrounding these teeth, and it stained only the surface of the teeth and would not go any farther. So that, under certain circumstances, when you have a coagulable material and a coagulator, just as soon as the affinity of that coagulator is satisfied by the water that is present the process stops—the coagulating process does not go any farther. Dr. Bethel, who is not here today but ought to be, presented some experiments at Saratoga in 1895, in which he showed conclusively that, if silver nitrate be introduced into the root of a tooth, acting as a root-filling and a preservative for any pulp tissue that remains, it only produces a superficial stain or discoloration. Consequently, I do not consider, from a strictly chemical and scientific standpoint, that the advocates of the coagulative agent under all circumstances and conditions, have proved their case; because, with the aid of Dr. Good of Chicago, one of my assistants in the Chicago college, we took a number of people and forcibly removed the pulps of the teeth, and in other cases destroyed them and filled the canals with carbolic acid and zinc chlorid when they were in the mouth, and within twenty-four or forty-eight hours extracted them; and then we tested those teeth outside of the mouth to see if any trace of carbolic acid had penetrated. We were unable to find where it had penetrated through the dentin, because the process of decomposition, as Dr. Buckley has presented here this afternoon, had not had time to take place.

Therefore it is a mistake to suppose that the instant you put carbolic acid or creasote or zinc chlorid or silver nitrate in a tooth it will penetrate immediately through the dentin before the process of decomposition has begun. That was the point I was making; and Dr. Buckley deserves our thanks for presenting in such a clear and concise manner the idea and fact that you cannot coagulate something that is not coagulable—because it is not there, it has been decomposed, and it is a new substance that you must deal with. Therefore the use of a coagulating agent and the penetrability of it through the dentin does not prove anything when the cementum has been filed off or cut off.

Dr. J. D. Hodgen. I wish to say that my own views are very much in accord with the essayist; and that, while I may differ in the treatment of putrescent pulp-canals, I wish in no way to be understood as criticizing the practical and scientific treatment which has been so clearly outlined. If your patience will permit, I will briefly review a portion of the histo-chemistry, which, although it has been mentioned by the essayist, I find necessary to a complete elucidation of the

method of treatment I am about to explain. I claim nothing new or original in what I speak upon, but in truth there is even more in it—something of even greater value to the scientific phase of our profession. The burden, therefore, upon your patience consists of my attempt to illustrate the application of pure chemistry to practical dentistry.

From a histological examination of the dental pulp we find it made up of connective tissue, nerve tissue, vascular tissue, and blood. Then, as has been admirably set forth in this excellent paper, we observe from a chemical examination of these tissues that they are clearly analogous with all other animal tissue in that they are made up, from a general point of view, of nitrogenous and non-nitrogenous substances; moreover, that the nitrogenous substances are protein or albuminous bodies composed of about 50 per cent. carbon, 6.5 per cent. hydrogen, 15 per cent. nitrogen, 21 per cent. oxygen, 0.3 per cent. sulfur, with occasionally a small amount of phosphorus, or even iron, in their make-up. It is also true that while the chemist can approximate a percentage composition of these protein and albuminous bodies, no one as yet has been able to state the definite chemical composition of any, not even the simplest of them. It is, however, none the less true that we recognize in these protein substances the chemical substrata of animal life.

In recalling the proteins which are most prominent in the make-up of the various histological structures of the pulp, our attention is particularly drawn to four, viz, fibrin (as a simple proteid), hemoglobin (as a compound proteid), and collagen, elastin, etc. (as albuminoids).

As has been said, the non-nitrogenous compounds of the pulp tissue are the fats (carbohydrates), composed of varying amounts of carbon, hydrogen, and oxygen in known definite chemical combinations. With these we are more familiar than with proteins. Theoretically, we say that all true fats are compound ethers of the triatomic alcohol glycerin, in which the three replaceable hydrogen atoms of the hydroxyl are replaced by three univalent radicals of the higher members of the fatty acids. The most important fats found in the pulp tissue are tripalmitin, $C_3H_5(C_{16}H_{31}O)_3O_3$, stearin, $C_3H_5(C_{18}H_{35}O)_3O_3$, and olein, $C_3H_5(C_{18}H_{33}O)_3O_3$.

Now, without being too exact, we may call your attention to the fact that the pulp organ is, from a chemical point of view, made up as follows:

Proteins and albuminoids.	*Fats.*
Fibrin,	Tripalmitin,
Hemoglobin,	Stearin,
Collagen,	Olein, etc.
Elastin, etc.	

From some cause the pulp organ is injured, becomes gangrenous, dies; passing through a number of changes, it finally reaches the putrefactive stage so frequently encountered in routine practice. We have seen what the healthy normal pulp organ may be like, histologically and histo-chemically. But, more essentially, what is it as we find it putrescent and poisonous in chamber and canal of the natural tooth *in situ?* In other words, when these normal pulp tissues decompose, what chemical change takes place? What is putrescent pulp tissue, chemically?

All organic bodies passing through the natural changes—decay, fermentation or putrefaction—are resolved into simpler compounds, elements, or substances. Leucin, an amido-acid having the formula $C_5H_{10}NH_2COOH$, is the constant product of the cleavage of proteins. Tyrosin is nearly as constant an end product of proteins as leucin, and is another of the amido-acids, having the formula $C_6H_4OHC_2H_3(NH_2)COOH$. Leucin is quite soluble in water, and, though tyrosin is only sparingly soluble, they both are very soluble in alkaline solutions and could be gotten rid of by the agency of the latter.

As a matter of fact, these like all complex organic bodies split up into simpler substances. As might be imagined from their constitution, fats are one of their end products, the others being for the most part gases, such as ammonia and its

compounds, sulfuretted hydrogen, nitrogen, etc. As we are all aware, it is these gases that cause the immediate trouble; but if the canal be opened into they escape, and the pain caused by their pressure disappears for the time being.

Now we have left for consideration the fats, embodying in their glycerin mass naturally more or less of these end product gases in solution, micro-organisms of putrefaction, etc., undecomposed substance, etc.

Chemistry presents many reagents for the transformation of fats, but nothing so common, so simple, and so practical, as the action of the alkalies. The old-fashioned housewife on the farm, with the lye extracted from the wood-ashes and the fats from the kitchen, made the soap for the family. In sodium dioxid, Na_2O_2, we have a chemical reagent as a remedial agent, which presents a threefold value:

First: As a saponifier of the fats left in the pulp-canal.

Sodium dioxid is very deliquescent, and as soon as it comes in contact with water, breaks up, forming sodium hydroxid, and liberates oxygen:

$$Na_2O_2+H_2O=2NaOH+O.$$

If there be any leucin or tyrosin present, these are dissolved in the alkaline solution. The fats present (tripalmitin, stearin, or olein) are saponified by the hydroxid, and thus are not only soluble but as soap act as a cleansing agent in the canal:

$$\underset{\text{(sodium hydroxid)}}{3NaOH}+\underset{\text{(tripalmitin)}}{C_3H_5(C_{16}H_{31}O)_3O_3}=$$

$$\underset{\text{(soap)}}{3NaC_{16}H_{31}O_2}+\underset{\text{(glycerin)}}{C_3H_5(OH)_3}.$$

The glycerin, of course, is soluble, and is therefore washed out.

Second: The nascent oxygen liberated from the Na_2O_2 disinfects any remaining tissue in the canal and dentinal tubuli, leaving, after thorough treatment, the tooth pure and wholesome.

Third: Furthermore, the escaping of the nascent oxygen from the liquid or semi-liquid mass, affords a mechanical assistance in freeing the tubuli, canal, and chamber of its putrid mass.

That nascent oxygen is the greatest possible disinfectant, the most natural, least irritating, and in every way best indicated for the mouth and oral tissues, is not questioned. The only question is whether a sufficient amount of it can be liberated in the canal and chamber. Let us examine the compound Na_2O_2 for a moment, to determine the amount of available oxygen stored there:

$$\begin{aligned} Na_2&—23\times2=46\\ O_2&—16\times2=32\\ &\overline{\quad\quad 78} \end{aligned}$$

$$78 : 32 :: 100 : (41)$$

$41\div2=20.5$ per cent. of available oxygen in sodium dioxid. Let us see what this represents in volume.

Take, for instance, 1 mgm. of sodium dioxid; that much with care could be used at a time in a pulp-chamber; 20 per cent. by weight of that 1 mgm. is available oxygen, or $\frac{1}{5}$ mgm. in weight. A liter of hydrogen weighs 0.0896 gm. One liter of oxygen weighs 16 times a liter of hydrogen ($16\times0.0896=1.4336$ gm. *n. t. p.*); therefore, $\frac{1}{5}$ mgm. would occupy in volume 1/5000 or $\frac{1}{5}$ cc., enough to fill scores of canals. By no other means can so great a volume of nascent oxygen be obtained *in situ*.

We can better comprehend what this means and what it will accomplish as a disinfectant when we compare it with other opportunities of obtaining nascent oxygen, knowing what can be accomplished by them: The aqueous solution of H_2O_2 is about 3 per cent. The ethereal solution of H_2O_2 is furnished us as high as 25 per cent., but it is very difficult to handle. Na_2O_2 furnishes 20 per cent. of nascent oxygen, and anyone can handle it—exercising no more than ordinary care.

Such a treatment of putrescent canals is, to my mind, not only chemically and scientifically indicated, but it is reasonable, it is practical and it is logical.

I fear I have tried your patience with my rehash of the sodium dioxid treatment. No doubt all are perfectly familiar with its use and action, but, as I have said, its use is so clearly scientific and so practical that I could not refrain from recalling it to your attention. More than

that, it affords an excellent example of how practical chemistry may be applied to practical dentistry.

In regard to the care and treatment of root-canals and the use of such substances as zinc chlorid, silver nitrate, carbolic acid, and the like, and of the volatile oils, I can but have this to say—much in support of what Dr. Harlan has said. Zinc chlorid, silver nitrate, and carbolic acid belong to a class known as coagulating antiseptics, and in a putrescent canal they are worse than useless; they are not only largely incapable of penetrating their own coagulum, and thus valueless in deep-seated putrescent conditions, but in their action they seal up the putrescent contents of the dentinal tubuli, thus making such contents a source of much irritation to the peridental membrane. To my mind they are, however, useful and are indicated in the case of canals from which the pulp has been extirpated while alive, as in the instance of cocain anesthesia, or in those from which the pulp has been removed before putrefaction or infection. Used in such a manner, coagulating antiseptics are indicated *because* of their coagulating property. They seal up the contents of the dentinal tubuli and largely prevent the putrefaction and infection of such contents.

On the other hand, volatile antiseptics are indicated in putrescent canals much as germicides, disinfectants, and antiseptics; the purpose of their use, owing to their volatile properties, being to disinfect and keep clean the tubuli until the canal can be permanently filled.

The Chairman. If there be nothing further on this paper, we will listen to the reading by the secretary of a paper by a gentleman from Japan, Dr. Sekiichi Enomoto of Tokio, on the subject of "Annealing Gold."

The Secretary accordingly read the following paper:

Annealing Gold.

Everyone knows that the slightest carelessness in the preparation of gold for filling teeth would jeopardize its working quality. Its softness, its adhesiveness to the cavity, its strong resistance to chemical reaction and mechanical wear, with the other advantages that make this metal the best filling material, are often totally impaired during its preparation as such.

In my long practice I have seen many gold fillings, and found them in a quite different condition than they were in at the time of filling. In some cases the upper layer flaked off, while in other cases the thin surface was pitted, such deterioration occurring both in new and old fillings. All these instances show that the requisite qualities of gold were lost. It would be no wonder if they occurred only in the work of inexperienced dentists; but the fact is that they frequently occur in fillings made by dentists of long experience and good standing.

The pure gold foils when heated become cohesive, so that when touched to each other they will adhere and not easily separate. Then what does the deterioration of the gold filling mean? Sometimes the cohesive power is injured by moisture, sometimes by the protrusion of the gold from the cavity, sometimes by excessive hammering of the surface of the filling, or by an unskilful use of the plugger point. But these are not often the chief causes of such deterioration. I believe the defective method of annealing gold, and consequently the use of gold not perfectly soft and cohesive, is responsible for the poor work. Let us briefly review the method of annealing gold pursued by the dentists of the day. The methods, I believe, can be grouped into three classes, viz, direct, indirect, and electric.

By annealing in the direct flame we mean the method of annealing gold pellets by bringing them in contact with the flame of an alcohol lamp or Bunsen burner. Usually a pellet is held in the flame with the pliers, or a fork-shaped instrument, or the plugger point. Each of these methods has one and the same defect, that the pellet is not homogeneously annealed. This defect is most evident in the case of the pliers. The end

of pliers cannot be easily heated, and by the time it has been heated sufficiently to anneal that part of the foil touching the pliers, the farther side of the foil fuses and forms a mass which is not sufficiently soft. If the pellet be not sufficiently heated for fear of the formation of a mass, it will not be sufficiently cohesive, and we shall have to use the pellets imperfectly annealed. We often mistake its stickiness due to the heat of its annealed condition, and make up for the imperfection of annealing by the mechanical use of the plugger. Usually it occurs that one-fourth is left imperfectly annealed. To perfect the annealing we must take up the pellet a second time, holding it by the annealed part. But this process is almost impracticable, except for the most skilful operator; the ordinary operator, I fear, will most probably fuse the pellet or else pass it too quickly over the flame. It is probable that the moisture of the flame will be absorbed in a part of the foil before sufficient heat will have dried up its moisture. It is a hard problem even for a skilled operator to distinguish a suitable annealing from stickiness.

The substitution of a plugger point or other instrument for pliers, though differing in width makes no difference from the fact that the gold cannot be impartially annealed. In addition, the pellet when held by such an instrument often falls in the flame or on its way to the tooth. These circumstances of the application of half-annealed and melted mass pellets for filling the teeth will never prove a success. I have good reasons for believing that the poor results after filling are entirely due to the deficiency of the annealing method.

Annealing by the indirect flame is the method of annealing gold pellets by placing them upon a metallic or mica tray over the flame of a Bunsen burner or an alcohol lamp. The superiority of this method to the former is, first, that no particular portion of the pellet will melt directly by the flame, and second, that it will be comparatively uniformly annealed by the heat through the tray. Its demerits are, first, the impossibility of determining the degree of annealing by the color of the pellet in daylight; second, the fact that an equal heat cannot be given to the pellet by the tray, which will be heated in different degrees owing to the movement of the flame due to the movement of the air, which the screen on one side of the flame cannot prevent; and third, as the pellets are exposed to cold air on their upper side and the other side is in direct contact with a strong heat, the defect is such as in the case of meat being roasted in an uncovered pan. Under these circumstances, insufficiently annealed and therefore insufficiently cohesive pellets will be placed into the filling, with the result that they will flake off later owing to the friction. This is another cause why a filling of improperly annealed gold is not a success.

The *electric gold annealing tray* was devised by Dr. L. E. Custer of Dayton, Ohio. The apparatus for annealing gold according to this method consists of a table having many square hollow partitions of different sizes providing for the pellets. By turning the electricity on, the gold would become perfectly annealed on both sides equally, without any injury to its efficiency. To one end of the partition a wire is connected for the electric current. The contrivance of the doctor is popularly approved as the best method of the day for annealing gold most evenly. But the scheme can be appreciated only by people who live in a city where they can get a supply of electricity during the day, and operators in less favored localities cannot participate in this advantage. The use of the galvanic battery for this purpose is too expensive and involves too much work to be universally used.

To summarize the defects attending the before-mentioned three methods of annealing. The direct and indirect methods are too defective, and the electric method is rather impracticable, though superior to the others. In view of the deterioration of gold fillings, I have devised an apparatus for annealing gold. It is a modification of the indirect method of annealing. The apparatus has

a cover which prevents cold air from reaching the gold foils and insures the annealing of them uniformly on both upper and lower sides. This prevents adulteration and develops its efficiency in the highest degree. The apparatus is entirely inclosed, with the exception of small holes through which air is supplied for the flame of the alcohol lamp inside, and thus the flame is prevented from wavering to and fro by any slight movement of air. The wick usually used for the alcohol lamp being too small to spread the heat under the whole surface of the tray containing the pellets, I have made use of a larger wick and placed it so as to heat the tray uniformly and in a shorter time. On one side of the annealer I have attached a second burner accompanied by a tray and a screen, on which the annealed foil is gradually cooled. According to Dr. Black's theory the cohesive power of gold will last for about an hour after it has been annealed, after which time it will gradually decrease. Experience shows that the warm pellet is more soft and retains more cohesive power than the cool one, hence this accessory apparatus has been added.

This apparatus is accompanied by three kinds of trays—of metal, of mica, and of sheet asbestos on a metallic tray. According to my experience the mica tray requires three or four minutes for perfect annealing; the metal tray about four minutes; and asbestos-metal tray five minutes—the time required for annealing depending chiefly on the thickness of the pellet.

The lower part of the annealing apparatus contains the alcohol holder, with the wick in the center. The tray is placed above the wick just beneath the cover. The apparatus has a door in the middle of its side to enable the operator to light the wick. The mica in the front part of the cover allows one to see the color of the gold as it is being annealed. A handle is attached to the cover by which it is easily removed with a plugger point. The screen protects the flame on its lateral sides and the tray above, with shelter at the sides.

The advantages of this apparatus, in my opinion, can be enumerated as follows:

(1) The lamp being entirely inclosed with the exception of the holes for passage of air, the heat emanating from the flame pervades the whole of the inside of the apparatus and prevents the adulteration of the gold from exposure to the cold air, which was one of the defects pointed out in the indirect annealing method. The cohesive and flexible nature of the gold is improved by this process.

(2) As the construction is such as not to allow the slightest movement of air inside the apparatus, the whole of the tray and the pellets on it are uniformly heated, and none of the gold will be left imperfectly annealed.

(3) It enables one to find a certain invaluable standard of the time and of the degree of heat required for annealing. Thus the defects of direct and indirect annealing are overcome.

(4) The operator using this apparatus has the satisfaction of being able to finish his work in a shorter time. He has no need to wait, after using a trayful of pellets, for the annealing of another trayful, he being able by means of this apparatus to use one trayful of annealed pellets while another is being annealed. The shortness of the duration of the operation is a very important thing to the patient, who is made extremely uncomfortable by the presence within his mouth of the rubber dam and clamp. We must of course sympathize with patients who are subjected to these uncomfortable gags.

(5) Alcohol, the source of heat in this apparatus, is easily procurable, while electricity, which is somewhat closer to our requirement, is difficult to obtain. A supply of electricity is obtainable in most cities, but in some the supply cannot be obtained except at night; and the substitution of a battery for this purpose is too expensive and involves too much work.

I humbly submit this scheme for criticism and for liberal suggestions, as I fear my self-confidence may lead me to overlook defects which it is possible may exist; and I hope, at least, that this method

will afford some convenience to dental practitioners.

Discussion.

Dr. A. W. Harlan, New York, N. Y. Dr. Black presented the first paper on annealing gold in 1869 at Bloomington, Ill., and until Dr. Custer presented his method of annealing gold with electricity, all sorts of schemes, not including the present method, have been used. They used mica covers, old pieces of Russia iron over lamps, and everything like that. I know this is true, because I was a student of dentistry at the time.

The Chairman. Is there any further discussion desired on this paper? If not, we will pass to the next—which, very unfortunately, must be read by title. It is on "The Uses of Aluminum," by Hof-Zahnarzt W. Pfaff, Dresden, Germany. (The paper in full here follows:)

Aluminum: (*a*) Investigations Concerning its Corrosibility; (*b*) Its Applicability in Dentistry.

The subject here presented is one which has occupied my attention for a long time, and concerning which I have occasionally reported. This essay aims at giving information to the profession upon the following questions: (1) To what extent aluminum is affected by contact with the food and beverages ingested as well as with the fluids in the buccal cavity, and whether hygienic objections may be raised against the application of aluminum in the buccal cavity; (2) In what manner aluminum may be utilized to advantage in dental technics.

First of all I intend to discuss the experiences thus far published, and of which I have, of course, made frequent use in my own investigations.

The fluids which we have to consider in respect to the human organism—*e.g.* pus, saliva, perspiration—affect aluminum very slowly, while sulfuretted hydrogen and ammonia exert no influence whatever upon it. No more do the particles of aluminum that may have been dissolved affect the organism.

The first investigator who took up this question, was Paul Siem, in his inaugural dissertation "Concerning the Effects of Aluminum and Beryllium on the Animal Organism." Siem's first experiment was subcutaneous injection of a sodium-aluminum double salt in combination with lactic or tartaric acid into the organism of cats, dogs, rabbits, and frogs. These experiments, in most of the cases wherever sufficient quantities were used, resulted in the death of the animals from paralysis of the respiratory organs. Further—and this is of greater importance—Siem added to the food of the animals aluminum salts, for four consecutive weeks, 0.1 gm. daily. This addition caused, in the first week only, acute diarrhea; from the second week and forward the animals subjected to this treatment comported themselves perfectly normally. Even in the urine no traces of aluminum were to be detected.

Therefore, aluminum salts directly injected into the blood, act as a poison, exactly in the same manner as a great number of otherwise quite innocuous salts would do; on the other hand, aluminum is not absorbed by the healthy stomach and intestinal canal—as little as, for instance, the metals iron and manganese in opposition to mercury, lead, arsenic, and beryllium, the latter likewise having been investigated by the same investigator.

Luebbert and Roscher made investigations "Concerning the Applicability of Aluminum for some Articles of Use," and they without qualification declared aluminum to be unfit for vessels of any description, on account of its great solubility in both acid and alkaline fluids. The experiments were conducted in the following manner by the authors of the above-mentioned treatise; viz, by allowing pure aluminum foil to stand for four days in different concentrated solutions at the regular temperature of the room, for the purpose of analyzing the filtrate or the ash for aluminum. These experiments, though, are not very reliable—first, because of the use of aluminum foil, which chemically comports itself quite differently from plate aluminum—the

first-mentioned substance being much more combustible and oxidizable; and secondly, the experimenters omitted to state how much of the surface was dissolved.

With this fact for a basis, the obvious question arises, How much aluminum may be considered to be innoxious—how much aluminum may be contained in the fluid, after liquid food has been kept during a night in an aluminum vessel? This question must be clearly decided before we can judge concerning the suitability or non-suitability of aluminum, since other metals also, even lead, are soluble in a number of organic fluids. In the Berlin waterworks, for instance, with constant regularity, traces of lead are found overnight; nevertheless no harmful influences could be ascertained. Thus G. Rupp, in an exhaustive treatise concerning the same subject, arrives at results widely different from those obtained by Luebbert and Roscher. Although he likewise found aluminum in the different fluids, but in extremely small quantities, Rupp does not hesitate to conclude as follows:

"Even when insignificant traces of aluminum in contact with foodstuffs and drinkables are absorbed, according to the results of my experiments, I feel safe in stating that hygienic objections are out of the question, considering the fact that using different kinds of food and beverages (as drinking-water) we introduce aluminum salts into the organism. In the same manner, using vessels made of copper, brass, tin, alloys of tin, lead, nickel, German silver, traces of these metals are incorporated into the food and beverages."

At about the same time G. Lunge and Ernest Schmidt in complete agreement have ascertained that aluminum may be unhesitatingly utilized for canteens and surgical instruments, since the power of chemical reaction of this metal is extremely low, and the absorption of such minute quantities of aluminum salts into the human body gives no ground for apprehensions of any kind.

Further, they undertook experiments concerning the solubility of aluminum by means of nitric acid. They obtained the following result, to wit, that after ten days' action of chemically pure nitric acid upon a surface of 100 square centimeters the following losses of weight of aluminum were registered:

Acid of sp. grav. 1.2: Loss of weight	1027.3 mgm.
Acid of sp. grav. 1.4: Loss of weight	399.7 "
Acid of sp. grav. 1.5: Loss of weight	37.8 "

That nitric acid will affect aluminum, when the metal is exposed to its action for some time, other experimenters have similarly demonstrated. The experiments by Koehler, "The Action of Nitric Acid and Sulfuric Acid on Aluminum," are deserving of special consideration. Koehler records the following loss of weight of the aluminum after the action of nitric acid for twenty hours upon 100 square centimeters of surface:

Concentrated nitric acid	80.5 mgm.
1 part nitric acid, 1 part water	80.5 "
3 parts nitric acid, 5 parts water	50.0 "
1 part nitric acid, 3 " "	19.0 "
Concentrated sulfuric acid (sp. gravity 1.83)	325.0 "
1 part sulfuric acid, 1 part water	187.0 "
3 parts " " 5 parts water	86.0 "
1 part " " 5 " "	30.0 "

According to Koehler the solubility of aluminum is not exactly inversely proportional to the percentage of sulfuric acid. These opinions of Rupp were confirmed, besides others by Prof. Dr. Clemens Winkler of Freiberg, who from the loss of weight of an aluminum spoon which had been kept in constant use for twelve years (avoiding strong mechanical action when cleansing the same) arrives at the conclusion that said spoon would be completely used up in 273 years. In this case it is evidently demonstrated that aluminum for articles of use may very well compete with other metals, for instance silver, as a longer duration of existence could hardly be claimed for silver spoons.

Concerning the deportment of aluminum under the influence of fats and fatty acids, Prof. E. D. Donath of Bruenn

writes as follows: "It is beyond doubt that fat and fatty acids, even with free access of air, exert almost no influence on aluminum."

Concentrated carbolic acid dissolves aluminum with vivid, even turbulent, reaction and disengagement of hydrogen. According to Donath, pure carbolic acid, free from water, has no influence on aluminum; but with this an observation of Zmerzlikoer does not agree; he found that aluminum was dissolved by carbolic acid with energetic development of hydrogen. These diverging results probably are explained by the diversity of the various kinds of aluminum on the market. Generally, the purity of the aluminum is of an importance not to be underrated as a factor of its durability, as has been especially demonstrated by Moireau. Pure carbonic acid, dry or moist, according to various experiments, has no influence whatever either on cast aluminum or pure aluminum plate. Water containing carbonic acid, even under strong pressure, shows very little action on aluminum. I made an investigation to study the influence of saliva on aluminum, for this purpose ascertaining the loss of weight of an aluminum plate which had been for several weeks carried in the mouth; the loss of weight did not even amount to one-ninth of one per cent. To the assertion that saliva causes sieve-like perforations I have to revert later on.

The influence of beer on aluminum is, according to a Bavarian opinion, not worth mentioning. This opinion calls special attention to the surpassing suitability of aluminum for the preservation and transportation of large quantities of beer.

Dr. Plegge, in his work concerning canteens and cooking utensils made of aluminum, very appropriately shows that neither from a practical nor economical standpoint could essential objections be raised against such flasks, and that from a sanitary standpoint the use of the same appears to be beyond reproach. To counterbalance the impairment of aluminum there is no necessity to consider the effect of salts that may reduce or increase such impairment; the best means of resistance is reasonable treatment with from time to time a thorough cleansing with "finest solution of soda" or in the worst case with concentrated nitric acid. In a later treatise he concludes, in agreement with G. Lebbin, that even when for weeks in contact with water, under access of air or with air excluded, aluminum shows no alterations. The white spots caused by water from the Berlin waterworks both authors attribute to the presence of silicic acid in conjunction with other mineral ingredients of the water. Even more favorable results were obtained by Ohlmueller and Heise, "Investigations Concerning the Applicability of Aluminum for the Manufacture of Eating, Drinking, and Cooking Utensils." They undertook their experiments by order of the Imperial Health Office, and for the purpose availed themselves of two kinds of aluminum; one kind contained about 0.05 per cent. crystallized silica, 0.4 per cent. silica in combination, and 0.3 per cent. iron, while in the other kind 1.2 per cent. of crystallized silica, 0.6 per cent. silica in combination, and 0.3 per cent. iron were contained. The articles experimented with (aluminum plate, aluminum canteens, and rolled raw material) were subjected to the action of the fluids mentioned for two, four, or six days respectively; besides independent cooking and shaking experiments were made. Distilled water was found to exert no influence whatsoever on aluminum, whether allowed to stand or whether cooked or shaken. On the other hand, with water from the waterworks, after twenty-four hours a noticeable loss of weight was registered; moreover, peculiar excrescences of partly white, partly brown color were seen. One per cent. acetic acid reacts, when standing, slowly; when boiled, more energetically on aluminum, while 2 per cent. tartaric and citric acid had very little or almost no effect on aluminum. Nevertheless aluminum was considerably affected by a 2 per cent. solution of table salt after protracted action, while half an hour's boiling dissolved but little aluminum.

As is shown by these experiments, the effects of acids on aluminum were the

opposite of those of alkalies, as boiling in acid accelerated the dissolution noticeably, while the influence at ordinary temperature was insignificant. Coffee, red wine, and lemonade, even after protracted action, were almost without effect upon aluminum. Exposed to the influence of cognac and spirits, excrescences could be noticed upon the aluminum. Of especial vehemence was the action on aluminum of a mixture of 2 per cent. table salt and 1 per cent. acetic acid. Likewise the fact demonstrated by other experimenters is of importance, viz, that the layer of oxid on the surface caused by contact with fluids, as for instance saliva, etc., affords protection against further destruction. The experiments by Ohlmueller and Heise concerning the action of aluminum on the animal organism lead to the conclusion that this metal, especially when taken in small doses, cannot exert any noxious influence on the organism.

In the work mentioned above, the following conclusions are arrived at:

(1) Aluminum for eating, drinking, and cooking utensils is affected, within the time in general to be considered, by acid as well as by alkaline fluids, and by solutions of salt, and this at the ordinary temperature of the room, but in a relatively low degree. At boiling heat the solubility varies and in some cases attains a remarkable extent.

(2) The corrosibility of the utensils often decreases owing to changes upon the surface of the metal.

(3) The cleansing process, according to the method used, entails necessarily a relatively important loss of the metal.

(4) An impairment of health due to food and beverages which have been cooked or preserved in aluminum vessels, is not to be expected under the conditions generally obtaining.

Extended and exact investigations concerning the suitability of aluminum were also pursued by Koehler ("Das Aluminum"). In his experiments the following substances were taken into account, viz, crown glass, ordinary glass, copper, brass, zinc, lead, and aluminum bronze—the last containing 5 per cent., 8 per cent., 10 per cent., and 12 per cent. of aluminum—tin, iron, and pure aluminum.

For each of these experiments, strips about 10 cm. long, 1 cm. broad, and of different thickness were taken; for the aluminum bronze the length was 5 cm. Each strip of the aluminum—of which in every case four strips were used, of 2 mm., 5 mm., 6.5 mm., and 10 mm. thickness, while of the other metals only one strip was used—each strip was first thoroughly cleansed, and after being dried in the exsiccator was weighed and then exposed in a flask to the dissolving properties of the fluids mentioned, as a rule, for 150 hours. For this purpose the quantity of fluid was approximately proportional to the surface of each strip.

The fluid having acted on them for a sufficient length of time, the strips were taken out of the fluid, cleaned with distilled water and alcohol with a chamois rag, dried in the exsiccator, and then weighed again. The loss of weight was then recorded, taking into account the different specific gravities.

In coffee, for instance, on 100 square centimeters surface, in 150 hours, were dissolved of ordinary glass, 0 mgm.; of crown glass, 0 mgm.; of copper, 0 mgm.; brass, 3 mgm.; zinc, 6.6 mgm.; lead, 19.459 mgm.; of 5 per cent. aluminum bronze, 6.5 mgm.; 8 per cent., 4.0 mgm.; 10 per cent., 5 mgm.; 12 per cent., 3.26 mgm.; of tin, 0.7 mgm.; galvanized iron, 0 mgm.; aluminum, 0.578 mgm. or 0.214 cmm.

Crown glass, ordinary glass, galvanized iron, and tin, in this case, comport themselves better than aluminum, while the other metals were generally characterized by far greater losses.

As for tea, the corresponding series of losses aluminum underwent, is as follows—in mgm.: 8 per cent. and 12 per cent. aluminum bronze, 0; galvanized iron, 0.5; aluminum, 1; crown glass, 2.2; ordinary glass, 4.6; tin, 4.9; 10 per cent. aluminum bronze, 5; brass, 5.6—after cleaning, 12.6; lead, 19.2; zinc, 17.3—after cleaning, 44.3.

To gain an exact insight into the experiments made by Koehler, I have veri-

fied a portion of his experiments and have also worked independently of them.

Aluminum bronze—of 5 per cent., 10 per cent., and 12 per cent.—iron, lead, and copper I exposed consecutively and in strips of equal size, for 100 hours, to the action of the same quantity of Pilsener beer, Münchener beer, lager beer, Berlin light beer, and Graezer beer. The result was that, except for the Berlin light beer, the loss of weight suffered by aluminum was far less than the loss sustained by other metals, and in general was insignificant. I pursued similar experiments with 2 per cent., 5 per cent., 10 per cent., and a saturated solution of table salt. Here aluminum occupied the most unfavorable position; consider also the slow action standing in solutions of salt or when boiled.

On the other hand, for red wine and white wine, under equal conditions, the behavior of aluminum was very favorable.

It is very difficult indeed to answer the question incidentally alluded to, viz: To what extent is aluminum affected by water? A series of experiments in my opinion confirms the view of Plegge and Lebbin to the effect that it is silicic acid and other mineral ingredients of the water which affect aluminum, but that the intensity of such corrosion—which is of special importance—is by no means exclusively dependent upon such acid, and no more upon its suitable proportion; on the contrary, for the determination of the extent of such corrosion the salts dissolved in the water co-operate, and probably also organic matter. Some ingredients retard corrosion, others promote it; with every change of the proportion of weight the action of the different factors is modified to such an extent that a calculation of the degree of corrosion of the aluminum is next to impossible.

It hardly needs to be mentioned that the water of different water systems shows likewise different action on aluminum.

Since air and free carbonic acid—the gases kept separately—produced no solution of aluminum, I caused air and free carbonic acid in combination to act on aluminum, but could not detect the slightest trace of solubility of aluminum. I made one experiment strictly observing the conditions as they prevail in a water-distributing system. The difference of pressure in the water system and in the open aluminum tube is, according to my experience, without importance.

I employed Mannsmann's aluminum tubes of such thickness that a rubber hose could be conveniently drawn over them. The closing after the filling I did by means of a stopcock. A kind of water from one system, of the Erzgebirge, that affects aluminum, filled into such a tube, furnished in six hours a corrosion of the aluminum amounting to 18 mgm. of dissolved aluminum per hour, constantly about 3 mgm. aluminum per liter. Water from another system, even after standing for some time in aluminum tubes, showed only an infinitesimal corrosion. Further, with an artificially produced composition of 100 mgm. of free carbonic acid and continued induction of oxygen, this water remained without effect on aluminum. Likewise an addition of hydrogen dioxid with 30 mgm. of available oxygen per liter, and notwithstanding the 100 mgm. of carbonic acid previously incorporated, did not cause any corrosion of the aluminum. The hardness of the water was about 4 per cent.

While experimenting with this water no appreciable corrosion of the aluminum could be obtained by means of increasing the amount of carbonic acid and oxygen; the water from the conduit of the Erzgebirge affected aluminum even after being evaporated to one-third of its volume. That, for the conduit water of the Erzgebirge, the effect of the chlorids and sulfates which were contained in the same, although in small quantities, are the factors in question, was proved by various experiments. Nitrates were not involved, inasmuch as for the corrosion ammonia salts were not at all present.

The further experiments I instituted consisted of laying Mannsmann's aluminum tubes in conduit water of 12°, 20°, and 50° C. respectively and determining

the loss of weight in twenty-four hours. While with the water of 12° and 20° about 60 mgm. to 70 mgm. of aluminum were found dissolved, the effect of the water at 50° was far in excess of this, moreover the surface of the aluminum was considerably corroded. The excretions consisted mostly of silicic acid and alumina in the proportion of 3:7.

The following experiment was interesting: A complete aluminum upper set of teeth which had been carried in a rather uncleanly mouth for two years was exposed for twenty-four hours to the same conduit water at 50° C. The result was surprising. The surface of the aluminum exhibited only insignificant traces of alteration; on the other hand, a brand-new plate, likewise consisting of pure aluminum, which had been exposed to the same conduit water during the same time, showed a considerably corroded surface. These experiments, which require but little time, prove that the corrosibility of the dental plates decreases in consequence of alterations upon the surface of the metal. Neither distilled water that is free from air nor distilled water that contains air and carbonic acid affect aluminum. Aluminum does not oxidize in dry air, but when the surfaces of aluminum are moist an abundant oxidation sets in. Moisture acts on aluminum in the same manner as on iron, viz, as a conductor of oxygen.

Aluminum suffered no alteration from carbonic acid—not even oxidized aluminum.

The less the percentage of silicic acid in the water, the less the solubility of aluminum; additions of silicic acid increased the solubility to a considerable extent. Minute additions of soda, sodium sulfites, calcareous spar, and table salt effected only an insignificant increase of solubility, while greater quantities accelerated the solubility considerably.

The results I obtained admit of the conclusion that in the different conduit waters different acids are present, and that these are of different effect on aluminum. But an appreciable corrosion of aluminum occurs only from silicic acid in the water, though the salts dissolved in the water—and, above all, chlorids and sulfates—increase the solubility of the metal.

And now I come to the second part of my work, the question of the applicability of aluminum in dental practice.

ALUMINUM IN DENTAL PRACTICE.

The first application of aluminum for dental plates took place at the end of the sixties—and, it must be admitted, with poor success. A general use of aluminum in dentistry appeared to be out of the question on account of the low resistance of the metal to the destructive influence of the fluids in the buccal cavity. The aluminum produced in those times had the harmful admixture of iron and silica in larger quantities, and the unfavorable results of the experiments which were instituted are to be attributed to this state of affairs.

Indeed, it was these discouraging results which were brought forward as against the introduction of aluminum for dental purposes. The well-known dentists Bean of Baltimore and Sauer of Berlin, it may be mentioned, again made tentative experiments with a view to the application of aluminum for dental purposes, but also with only partial success. Each worked according to his own method of casting; for which process they availed themselves of self-constructed molds. The procedure of Bean was rather complicated and was handicapped by the following defect, viz, that only the plate was cast, while the teeth had to be soldered on later. Such plates were soon decomposed in consequence of galvanic currents which are due to the contact of the aluminum with another metal. On account of this factor the experiences with this metal obtained at that time in America were unfavorable. The procedure of Sauer, however, possessed greater simplicity and perfection. He was the first experimenter to cast under pressure by surmounting the molding pieces of the plate with a column of aluminum as a molding head. Sauer also cast the plate directly in union with the teeth, in this manner avoiding the

soldering. Various reports concerning the unsatisfactory results obtained with aluminum plates created in Germany a generally unfavorable opinion concerning the value of aluminum. After the seventies a more or less lively exchange of opinions concerning the value of the new material took place, and the advantages and disadvantages of aluminum were ventilated. The result was still unfavorable, however, for the new material. Considering the responsibility of the dentist, there is no ground for surprise that after these results there prevailed a certain hesitancy to employ aluminum any longer in practice, especially since the effects of aluminum salts on the organism were not known.

The necessity of doing the casting under pressure led Dr. Carroll of New York to the idea of melting the aluminum in a crucible with a perforated bottom and forcing the molten metal by means of air pressure through the perforations into the mold. With the cast plates produced under such pressure, partly favorable results were obtained. It would lead too far should I attempt to mention all the men who, following their conviction concerning the superiority of the new material, have spared no pains to introduce aluminum cast plates in the practice of dentistry, nor do I intend to mention all methods of casting and molding which in part are modifications and in part new methods.

The origin of the combination method of aluminum and rubber reaches back to the sixties; but only a very slow, almost imperceptible, progress of this procedure can be recorded up to this time. It was Suersen of Berlin who made the first practical experiments with a combination of aluminum and vulcanized rubber and in this manner built up the foundation for further development of the aluminum technique. What, we may ask, is the explanation of the heretofore underrated importance of aluminum for dental purposes? The explanation is contained in the fact that we were satisfied with results obtained by clinical observation, and did not care to gain a further knowledge by experiments aiming at ascertaining the causes of the corrosibility of aluminum in the buccal cavity. At intervals a very lively ventilation of opinions took place in the professional papers and conventions of dentists, but nothing new was evolved.

After a perusal of the literature at hand treating of this subject, in almost all the different treatises I have failed to find that strictly scientific methods have been followed. The authors in question confine themselves to stating the fact—in most of the cases assumed from other sources—that aluminum in the mouth is subject to corrosion—and venture all kinds of assertions why this is so and could not be otherwise; but there is a palpable lack of exact experimental investigations, of statistical material, or anything else of convincing power. One writer tried to find, and really found, the cause for the corrosibility of the aluminum in the overheating of the metal; another attributed the responsibility for this fact to acids contained in the buccal cavity; another finally held the alkalies responsible for the low power of resistance of aluminum in the mouth. Only with a few—for instance, Sauer—did I find experiments which I could consider as reliable. But Sauer was induced by unfavorable results in practice to desist from comprehensive investigations concerning the aluminum-destroying properties of the fluids in the buccal cavity, and to occupy himself more with aluminum bronze.

Allow me to again call attention to the rule that we should not give opinions based on theories that are not proved. Scientific problems—when aiming at practical results—must be investigated exactly; for new facts that can only be proved by sufficiently methodical experiments—in our age, so prominently given to the study of the natural sciences—are not to be demonstrated by recourse to preconceived theoretical leanings, even when brought forward with strictly logical acumen.

From this—I believe inevitable—digression I now revert to my experiences and the methods I employ in treating aluminum.

Personally I have employed aluminum in practice since 1893, and never have had to register lack of success that could have thrown discredit upon this material. Lack of success I have seen in my practice only when I had made use of aluminum where it was not suitable on account of the "bite," or with partial plates, and above all with single-tooth plates, where the aluminum tongue that has to bear the tooth or teeth proves to be too feeble a support for the rubber. The cases of poor success which other practitioners have reported, where, with the employment of complete plates, the plate, it is said, showed corrosion after it had been in the mouth only a few days, I attribute to the inferior composition of the aluminum and to the lack of adequate knowledge of the aluminum technique. In the mouth—as is generally understood—only pure aluminum should be used. Aluminum, in my opinion, will never displace gold in dentistry, any more than it will supplant iron in other industries; it is sufficient that it helps to limit the use of caoutchouc, which in many cases is destructive both to the teeth and the gums. To every dentist the disadvantages to which caoutchouc in most of the cases subjects the bearer are familiar; for this reason I may dispense with a discussion of that phase of the subject.

The special merits of aluminum are its extraordinary lightness, its slight metallic luster, its indifference to the action of the mucous membrane in the mouth, its remarkable susceptibility of polish, easy method of working, resistance against oxidation, and superior capability of adhesion. But it is only pure aluminum in which the power of resistance to the acids in the mouth is so satisfactory; aluminum with a more or less strong admixture of silica and iron is in the long run subject to electrolytic as well as chemical decomposition. The dentist must be on his guard not to employ too soft an aluminum, but only the so-called hard aluminum, which nevertheless possesses a sufficient degree of elasticity, and notwithstanding which it is not easily spoilt by bending. By a too strong heating aluminum loses its elasticity, therefore it should be heated at the utmost to a red heat of low degree, and should be always allowed to cool slowly. Otherwise, instead of its merits, aluminum will exhibit a multitude of demerits, as by overheating, as well as by too rapid cooling, it becomes soft and brittle and often breaks. All impurities adhering to the aluminum after rolling or stamping should be carefully removed, otherwise they will afford favorable points for corrosion by all kinds of chemical reagents.

The thickness of the plate never should be below 0.7 mm., and even then should be used only for complete adhesion plates, as thin partial plates are easily bent. In the last-mentioned case the plate should without fail be 1 mm. thick. Only the careful practitioner will be able to treat aluminum with success, since only an aluminum plate executed without a flaw from start to finish, and where all possible eventualities have received due consideration, will satisfy both the dentist and the patient.

Unfortunately, we have in aluminum technique a variety of methods for attaching the caoutchouc which are enough to discourage the beginner. All of these systems I have submitted to a close examination, and I consider only a few of them worthy of imitation. At present I work exclusively in pursuance of a procedure in which, by the picking out of barbed hooks on the plate, the teeth are fastened by means of caoutchouc. Many are the sins of practitioners in the point of fastenings, some of them perforating the aluminum from all corners and angles. They seem to place the principal value in as many fastenings as possible, lest the caoutchouc jump off from the aluminum; thus they do not appreciate the fact that the base-plate—in this case the aluminum—during mastication has to withstand the greatest resistance, and therefore should not be weakened immoderately. Further, many dentists do not consider the fact that aluminum in the mouth, brought in contact with other metals, will cause electric currents. To avoid this and obviate the decomposition of the aluminum, we must be on our

guard not to lay the tooth-pins, gold braces, or wire fillings on the aluminum, but on the contrary to imbed them carefully in the caoutchouc. The caoutchouc layer, in point of fact, may be very thin, and with some practice a complete isolation of the aluminum is secured. For the preparation of partial plates a double measure of precaution is advisable, especially when single teeth are to be replaced and where the aluminum tongue serving the purpose of attachment, that passes between natural teeth, is necessarily narrow. In such cases, wherever a replacement in aluminum is insisted upon we should at least apply the fastenings not only to the metal tongue, but also to the aluminum strengtheners that include the adjoining teeth, in the manner of a clamp.

Without qualification, I find the employment of aluminum ideal for complete adhesion plates. Here we may, as I mentioned above, use thinner plate than for partial pieces, since the danger of spoiling the plate by bending hardly exists in the case of complete upper plates. For complete plates of the mandible it is well to use plate 1 mm. thick. It is worthy of special attention that for the lower teeth, above all where molars and premolars are to be replaced and the front teeth are still extant, the entire aluminum plate should upon the exterior side be covered with caoutchouc to obviate the bending of the plate. Other dentists prefer in such cases double stamped plates which must be riveted carefully; personally, I prefer the first-mentioned method.

As to the preparation of aluminum plates I observe the following mode of procedure: Having taken a plaster-of-Paris impression, I make therefrom a Spence metal cast, as I prefer one of that material to one of plaster of Paris, for it cannot be damaged by the manipulation incident to the adaptation of the plate, adjustment of the clasps, etc. If greater sections of aluminum work are to be executed, or complete upper plates, first of all I obtain information concerning the condition of the palate, especially whether the mucous membrane of the hard palate at the place where the aluminum plate should end, to the side of the palatal suture, be soft; further whether there exist raised hard places on the palate. Such areas are often found in the center of the hard palate at the juncture of the two palate bones. Raised hard places in the palate I cause to lie hollow by scraping round these places in the impression; the effect is the same as from a vacuum chamber. Moreover, in cases of abnormally soft mucous membrane of the palate, I am in the habit of scraping sideward to the suture of the palate for the purpose of effecting thorough adhesion of the plate at this place.

Since for aluminum work, as generally for metal work, several casts are required, it is well to obtain a duplicate of the cast made from the original impression. With a mass of modeling composition an impression is secured of the Spence metal cast from which may be obtained at any time an additional one. And it is absolutely necessary that the metal plate with teeth be finished only on a model upon which the plate everywhere fits well, a circumstance of the highest importance for articulation. Taking into account the scraping of hard places, of vacuum chambers, of the posterior margin of the palate, it is clear that good articulation can be secured only when from the beginning of the work a definite model is employed. Often it is advisable to take an impression with the molded plate in the mouth—as, for instance, where long teeth projecting far into the mouth, or strongly recurved and especially loosened teeth, are present. In this case, where mostly we have to be content with an unsatisfactory Stents-impression—as otherwise, taking an impression on plaster of Paris, there would be the danger that the latter could only be obtained by sacrificing the loosened teeth—it is certainly advisable that we convince ourselves of the good fit of the plate in the mouth, by fitting-in the same and taking an "impression" before finishing the plate.

Being satisfied that the mold has turned out well, we undertake the swaging of the plate. For the purpose of

exactly measuring the size of the plate to be prepared, we have to mold a piece of lead or tinfoil cut according to the size, and after reducing the molded foil by clipping we fit the same to the aluminum plate. In this case we do well to take the size of the plate a little larger. Now we fit the plate superficially to the impression, to avoid bending while pressing the same. Before proceeding with the first pressing, the plate is to be thoroughly heated and then cooled slowly, to render the aluminum softer and more flexible. In heating the aluminum we have, on the other hand, to avoid overheating; brittleness and loss of the already low elasticity would be the consequence of such oversight. Haskell, for instance, heats the metal until a match placed thereupon begins to char. Likewise we should employ all possible precaution to prevent too sudden cooling. Further, it is advisable to oil the mold well; this facilitates the pressing.

The first time we should press only lightly—namely, in such a manner that the impression of the teeth is marked on the plate. Hereupon we open the flask, clip off the superfluous part of the plate and then press again. Having convinced ourselves once more of the proper position of the plate, we press with more energy for the purpose of finishing the plate under gradual increase of pressure. A firm and equable sitting of the plate without the slightest rocking results after it has been molded to a finish, so that when taken to the model which serves for further elaboration the plate will fit the latter perfectly. As for the pressing, it is well to proceed carefully, and especially so in cases of highly arched palates with recurving places. Here the aluminum would undoubtedly tear should we start at once to press with considerably energy. Furthermore, the mold would suffer too much without sufficient preparatory pressing of the plate, and we should have to resort to the casting of a second, and may be of a third mold. Therefore, to avoid unnecessary work with high palates, we may proceed in the following manner: After preparatory stamping of the plate we remove it and fill the space yet left between the aluminum and the palate with lead or tinfoil, putting over the palate some rubber dam, and then gradually finish the pressing; then follows the fitting in the mouth and "bite-taking" with the plate. Recurving places at the alveolar margin, finally, are rectified on the model, using a wooden or horn hammer.

In fitting-in the plate we devote special attention to small depressions, and see that the plate after energetic pressing sits firmly, does not "ride," a fault that may be due to the remaining teeth or to roots not sufficiently cut down. The plate, after pressing on, must show everywhere equable adhesion. If this be the case, we take a "bite" with the aluminum plate, then set up the teeth, in exactly the same manner as for vulcanite.

Considering the last-named to be a thoroughly familiar manipulation, I merely mention it, and advert to the fastening of the caoutchouc on the aluminum. There are various methods employed for these fastenings and I shall try to give a short description of them, leaving it to the judgment of each member of the profession to form conclusions concerning the merits and demerits of the different methods.

As for the methods of fastening with caoutchouc, we have to note that the junction between aluminum and caoutchouc can be only mechanical, and must therefore be firm and durable. It is possible to secure with the caoutchouc attachment a very exact articulation, and there is no danger of dislodgment of the plate, as is the case when resorting to soldering—two very decided advantages compared to soldered plates. The production of the means of attachment is of course different from that used for gold or plates, where they consist of tacks riveted on, wires, springs, etc. In the case of aluminum we arrive at the same results by means of barbed hooks picked out by a graver, by roughening the plate, by the riveting of tacks, by bending off and then perforating the plate, etc.

I pursue the following method: After carefully boiling out the wax, I define along the edge of the maxilla a groove

toward the inner side of the palate, somewhat depressed; in this manner I obtain an excellent fitting of the caoutchouc. Then, using the same graver, I pick out small barbed hooks in every direction, and finally I roughen the aluminum along the channel mentioned above. This method I have employed for many years, and may recommend its adoption. One precaution is urgently required, viz, to set the plate on the cast when applying the fastenings, thus obviating the bending of the plate. For lower plates, which are even more liable to bend, it may be recommended to cast within the plate a model of plaster of Paris, and to take off the plate only after the places of adhesion have been provided for. Thus stability of the plate is secured. An aluminum set produced in pursuance of this method will give full satisfaction, especially as the palatal surface of the aluminum will remain perfectly free from caoutchouc. Of other methods, one which has met with much approval is that in which the caoutchouc is fastened with riveted aluminum wire tacks which are driven through from the palate side of the plate. Beforehand, the places are to be defined exactly where the tacks are to be riveted; moreover, we must see to it that the tacks be not in the way of an artificial tooth or the pins of the same. It is best to press through the respective places a little by means of a triangular scraper, using a model of plaster of Paris as the basis of the plate, so that the said places will appear on the palate side as small eminences.

Now the plate is to be laid upon the counter mold in such manner that the palate side of the plate will lie above; then, with a drill corresponding as far as possible to the thickness of the wire tacks to be used, vertical holes are to be drilled through the plate and the mold, corresponding as nearly as possible to the length of the tacks. These tacks are then driven into the drill-holes by means of a small hammer and punch, whereupon they are carefully riveted to the palate side. Then the plate is to be pressed again. To facilitate the separation of the plate—which literally is nailed on—parallel direction is given to the drill channels.

But the reliability of this manner of fastening leaves much to be desired; the result, it must be conceded, is by no means in proportion to the care bestowed upon the work. Moreover, for instance with partial plates, the plate is weakened to a considerable extent by the tacks which are riveted-in in couples. The method of using screws, therefore, stands in higher favor.

Having taken an impression with the plate in the mouth, after casting the plaster-of-Paris cast, the places are to be defined, using a triangular scraper, where one intends to supply screw threads in the aluminum. With a tap that corresponds to the aluminum wire screws to be used, first of all the thread is cut into the plate; the wire screw is then moistened with oil and screwed on from the palate side. But of this method I likewise have no high opinion, for two reasons: in the first place the aluminum plate cannot be made thick enough to offer to the screw a sufficient hold; then, again, aluminum is too soft for this method of fastening.

An excellently strong junction between aluminum and caoutchouc is obtained by covering that part of the aluminum bearing the fastenings, before filling in the caoutchouc, with caoutchouc that has been dissolved in chloroform or benzine and allowing it to dry thoroughly. May I again emphasize that before filling in, a junction absolutely free from dirt or oil must be effected for the caoutchouc, as otherwise an intimate adhesion of caoutchouc and aluminum will not take place. All the wax must be carefully boiled out with hot water and then thoroughly washed out with benzine; only with the use of this precaution will the rubber permanently adhere to the aluminum.

The covering of the plate with plaster of Paris is executed in almost the same manner as for caoutchouc, with only the slight difference that the aluminum plate is covered with plaster of Paris up to the wax.

The filling-in is to be done in the usual

well-known manner, only that after the filling subsequent heating should be avoided, as aluminum by itself, owing to its high specific heat, retains the absorbed heat for a long time.

The vulcanizing done, the caoutchouc covering is worked out in the usual manner. Finally any rough places are polished with pumice-stone, and then after thoroughly washing and drying the plate it is polished over again with chalk. But, *De gustibus non est disputandum.* One person prefers bright, another dull polishing. The latter may be secured by boiling the plate a short time in a solution of soda; but, considering that soda is one of the most dangerous destroyers of aluminum, the metal should be brushed thoroughly several times after the boiling. The aluminum after this treatment shows a beautiful dull white surface. Nevertheless I cannot refrain from warning against this procedure of maceration. In addition to the fact that with the influence of soda, caustic soda, and other alkalies there follows a loss of substance which is not to be underrated, we must in this case recognize the fact that the macerated plate will be from both sides subjected to the alkaline saliva and organic acids, such as acetic and lactic acid as well as others; this, in time, will result in a considerable loss of substance of the aluminum. A further inconvenience is that caoutchouc is strongly affected by hot acids and alkalies, and that, above all, coloring matter is dissolved which will discolor the caoutchouc. Besides this, the firm junction between caoutchouc and aluminum would probably suffer.

Where dull-colored plates are absolutely insisted upon, it is advisable to do the maceration before vulcanizing. To remove the oil used for polishing, it is then best to use benzine and soap and water.

A special obstacle to the application of aluminum consisted for a long time in the fact that the metal could not be soldered. Indeed, different methods of soldering were invented, and the "Société d'Encouragement," etc., once paid to Mons. Mourey a premium of 200,000 fr. for a method to solder aluminum invented by him. But so far no procedure of soldering has covered the requirements. Later on, practitioners tried the expedient of soldering copper-plated aluminum (which can be worked like copper plate and also soldered) and then dissolving the copper in nitric acid. But this procedure, likewise, did not enjoy any long duration.

Whether in the future a method of soldering aluminum will be discovered or not, may nowadays be considered as a matter of indifference to the profession, since we possess in the aluminum-caoutchouc plates a substitute, one better than which we could not desire. Therefore let us energetically combat the old prejudice still surviving with many dentists against the practical application of aluminum. Though some time ago aluminum was not able to resist the fluids in the buccal cavity, and as a consequence the metal often after short use was perforated like a sieve, now we know the cause of the trouble; and we know that pure aluminum properly treated, using all necessary precautions, will do excellent service in the buccal cavity. Furthermore, we know that the corrosibility of aluminum plates due to changes on the surface of the metal decreases continually. This alteration consists of a brown membrane-like covering which appears after a short time on the surface of the aluminum, especially in mouths that are not kept very clean.

These statements, I hope, will be sufficient to prove that theory and practice, the results of scientific investigations as well as the experiences of the technical practitioner, may encourage the dentist to apply aluminum in the buccal cavity unhesitatingly.

The CHAIRMAN. This concludes the program of the Section on Chemistry, and there being no further business before the section, it now adjourns *sine die.*

(To be continued.)

THE AMERICAN DENTAL CLUB OF PARIS.

Reports of Meetings held in 1901, 1902, and 1903.

Meeting of January 1901.

A meeting of the American Dental Club of Paris was held on January 5, 1901, at the offices of Drs. I. B. and W. S. Davenport, Dr. I. B. Davenport in the chair.

Dr. Burt presented his new solder, composed of 22-karat gold, 3 gm.; platinum 1 gm. He finds it more suitable for the strengthening of bands in crown-making than the Williams clasp metal as recommended by Dr. W. S. Davenport.

Dr. W. S. Davenport then demonstrated his method of making crowns, as described in the *International Dental Journal*, July 1894. Briefly it is as follows: He accurately fits a thin platinum band to the model of the tooth and then solders at two or three points on the outside of this band, a little distance from the gum line, a small platinum wire. The band is then forced over the tooth or root to be crowned, the wire serving as a support to the band while being pushed to place; when well adjusted to the root the band is removed and its free edges are snipped with scissors in such a way that when replaced on the tooth the ends can be bent over and against the end of the root or against the side of the tooth by the overlapping of the contiguous free ends. Then all is removed and clasp metal is flowed over all to strengthen the band, the wire outside serving as a guide and conductor for the solder. Afterward the bite is taken and the articulation built up, or facings are soldered in the usual way.

Dr. I. B. Davenport showed a double magnifying glass—"Berger's loupe binoculaire"—valuable in the preparation of cavities for, and in the making of porcelain inlays.

He also presented a model of the dentures of an orang-outang belonging to Dr. Cunningham, showing three supernumerary molars in perfect line back of the normal teeth, two upper and one lower. Dr. Davenport said he had noted at the Jardin des Plantes, Paris, three extra molars—two lower and one upper—in the skeleton of a gorilla. He then read the following paper:

The Uses of Glass Rods and Tubes in Dentistry.

I use glass rods, first—To make the thermal test when I wish to determine whether a tooth is dead or alive; secondly—To heat crowns and bridges being set with gutta-percha; thirdly—To soften gutta-percha and permit the removal (if necessary) of such crowns and bridges; fourthly—As a means of cauterization. Many other uses will daily suggest themselves to the practical dentist—as for handles, burnishers, etc. Formerly I used a heavy copper instrument for the first three purposes enumerated; but copper was so good a conductor that the whole instrument became heated and finally burned out the handle, and was always liable to burn the fingers or the patient's lips. A glass rod has the advantage of being a bad conductor, so that when red hot at the end it is almost cold three or four centimeters away.

While attending the Pasteur Institute course we were taught, whenever an inoculation or serum injection was to be made or an aspiration practiced, to first heat a glass rod red-hot at the end and cauterize the point to be operated upon. This killed all the microbes in the territory. Then, after removal of the syringe, the point was again touched to seal the opening.

Glass tubes have a hundred uses about

an office. We may use them in connection with our various apparatus which are always breaking and needing to be replaced, and we may make besides many serviceable things, such as drop tubes, medicine carriers, and pipettes of all sizes. A number of the latter drawn out fine and sealed at one end and plugged with cotton at the other, and sterilized by heating over a Bunsen flame, should always be on hand, since they are often handy for various purposes—especially if one be a microscopist, and desires to use the tubes for the collection of pus, etc. Pipettes of larger size are easily graduated and are most convenient for the measurement of liquids or for the transfer of medicines from one bottle to another.

Many things can thus be accomplished with but a slight knowledge of glass-working, while a great range of usefulness is opened to one who cares to devote a few hours to the reading of some practical book on glass-blowing and glass-working. I presume that a certain amount of glass-working is now taught in the various manual training courses for dental students. It is in one, at least, and should be in all.

In conclusion, Dr. Davenport described the proper method of using the sterilized pipettes in the collection of pus, and indicated the precaution to be observed to avoid the danger of its contamination from external sources.

Meeting of February 1901.

A meeting of the American Dental Club of Paris was held on February 9, 1901, at the office of Dr. Hotz. The president, Dr. I. B. Davenport, called the meeting to order.

Dr. Wm. Hirschfeld reported a new method of replacing a broken tooth upon a permanent bridge in the mouth. The bridge in question was perfectly made and could not be removed without ruining it. It was necessary to replace a tooth immediately. The thickness of the bar made it difficult to drill the usual holes for the new tooth-pins; besides, it would have weakened the bar. He finally decided to solder a flat tooth to a strip of gold plate of the width of the tooth and space, and long enough at each end to permit of their being bent around, one above and the other below the bar, thus clamping the latter—the bar of the bridge, of course, being first properly fitted for this clamp, and the band or clamp backing of the tooth being perfectly adjusted to the bar and strengthened by solder at the angle nearest the articulating portion of the tooth before final fixing.

Will this finally open and let the tooth slip off? Dr. Hirschfeld was of the opinion that it would not do so if the articulating end of gold be left long enough to properly overlap the bar, and possibly hide itself under the gum. This plan seems best adapted to cases wherein the repairing has to be made without soldering. After six months it still remains perfect.

Dr. Hotz said he had best succeeded in such cases by fitting a plate tooth and after grinding undercuts on the tooth as well as on the bridge, cementing the tooth to place.

Dr. Hayes suggested that if Dr. Hirschfeld had built up an inner cusp of gold on the portion of the gold band which passed over the articulating surface instead of leaving that portion flat, it would have strengthened the work by equalizing the force of mastication. The bite being thus balanced would bring the force directly upon the center of the bar instead of tending to force off the tooth as is now the case with a single cusp.

Dr. I. B. Davenport. I am glad to hear Dr. Hayes insisting upon the articulation in this case. It is a most important factor in the stability of crown and bridge work. The inner cusps not only give strength by distribution of the force, but with the articulating teeth the bridge is held in the arch, instead of being driven out of place, as are those *inclined plane bridges* consisting of a row of canines put in merely to please a proud woman by closing up a gap.

Dr. Daboll showed his method of taking impressions of cavities for inlays be-

tween the teeth. He puts on the separator if the teeth are tight together, and then uses a little impression cup, which he makes of very thin steel so shaped as to hold and force the wax well into the cavity and remove the same without bending the wax. The cavity is of course first prepared as usual; the tooth is oiled so that the wax will not stick, and is wiped clean. He finds the system specially advantageous for building out the corners of teeth. The mold is made in plaster and allowed to become very hard. The plaster mold is then placed in Ash's swaging apparatus and a gold impression is secured, the gold being forced to the walls of the plaster cast of the cavity by a rubber plunger filled with water—really a water-bag, the inlay being baked in the usual way in the gold mold. For the impression, Dr. Daboll finds the ordinary pink wax the most suitable.

Dr. Hirschfeld. Do you prefer this method to that advocated by Dr. Jenkins?

Dr. Daboll. Not for all cavities.

Dr. Roussel presented the following formula for a mouth-wash:

I.

℞—Alcohol,	25 gm.
Oil of eucalyptus,	3 "
Menthol,	3 "
Thymol,	3 "

II.

Alcohol,	250 gm.
Solution 3 p. c. boric acid in distilled water,	500 "

Mix I and II, and color with anilin yellow.

Dr. I. B. Davenport showed casts of several cases of malocclusion, one with plates *in situ* for spreading the upper and lower arches simultaneously, being modifications of the Coffin plate. In upper plates he employs a wire upon the back of the plate in addition to the principal spreading wire upon the front, to enable him by bending the wire to spread the back teeth, if needed, or to prevent them from being forced inward by the reaction of the unsupported back end of the plate against the anterior spring. This is seldom necessary, but he had found cases in which after the usual spreading of the anterior portion of the arch, comparative measurements before and after the operation showed actual contraction in the molar region.

In another case the teeth articulated nearly end to end, but on one side only, the outer upper cusps biting inside the corresponding lower cusps, thus making it necessary to spread that side more than the other. The plate was split throughout its entire length, the gap being made wider at the level of the teeth requiring the greater displacement, the anterior and posterior ends of the detached portions being united to the corresponding portion of the plate by a wire at each end, which by bending as needed widened the split in the plate and rapidly moved the teeth into position.

Dr. I. B. Davenport also presented the following report:

A Case of Open Bite showing Result Without Treatment.

The casts [see illustration on opposite page] shows the condition of the teeth and the articulation of a young lady aged nineteen. Owing to the short rami and undeveloped angles of the mandible only the molars occlude, while the front teeth are held widely apart—fully one half inch. Notwithstanding the great deformity, the lips are so well developed that one would not suspect the deformity either during conversation or repose. I acknowledge having made my first examination of the mouth (a hasty, incomplete one) without having noticed the defect.

I also present two photographs of the patient taken at different ages, the latter at about the time the plaster casts were made; the photographs were taken as family souvenirs and not for the purpose of recording the case. Nothing whatever has been attempted to correct the defect, and the patient desires the present condition of her mouth to remain undisturbed. Had a course of treatment to correct the relations of the teeth in the two jaws been carried out, how easy it would have been to interpret these same photographs, before, during, and after treatment, as

showing what marvelous results had been achieved in the facial lines and expression as the result of such treatment!



We see here, how we may deceive ourselves by crediting to our operative intervention that which nature alone had spontaneously accomplished.





Meeting of March 2, 1901.

A meeting of the American Dental Club of Paris was held on March 2, 1901, at the office of Dr. Wetzel. The president, Dr. I. B. Davenport, called the meeting to order.

He then introduced Dr. J. Choquet, who spoke as follows:

A Type of Malocclusion.

I would like to call attention to an uncommon type of malocclusion, one which has never been classified in standard works. It is the condition, as you see in my own mouth, where the upper front teeth hide completely the lower teeth, even biting into the gums, the latter being actually lacerated by the canines. A point of additional interest in my case is that it is absolutely hereditary in our family, my grandfather, my mother, myself, and my daughter having the same condition. Is it possible to correct this type of deformity?

Dr. A. Wetzel. This case reminds me of a similar condition once observed in a boy eight years of age. I treated the case by placing a vulcanite plate over the deciduous molars, leaving the first permanent molars free. Within two months the latter had elongated sufficiently to restore the relation of the incisors, leaving a space between the upper and lower deciduous molars of two millimeters.

Dr. Robinson. This is a question of raising the bite. Some years ago I had a series of conversations with Dr. I. B. Davenport concerning the results of the extraction of the first molars, and one of the points to which he attached considerable importance was that their extraction was likely to be followed by a lowering or shortening of the bite. Now, in undertaking the regulation of short-bite dentures, the first step should be to raise the articulation in the region of the molars. This is easily done by inserting a rubber plate, thereby preventing the elongation of some of the teeth, and allowing it in others.

Dr. Burt. I have treated several cases of this kind, but for older children instead of covering the teeth I covered the palate only, allowing the lower front teeth to strike on the plate and the back teeth not to touch. This allows all the bicuspids and molars to elongate and thus raises the bite.

Dr. Robinson. Can the lower incisors be depressed?

The President. They can; we often see a tooth forced into the mandible. Dr. Younger, I am sure, will support this view, as he often accomplishes this by his system of regulating with ligatures.

Dr. Younger. A tooth can be moved up, down, or in any direction.

The President. Dr. Choquet's case interests me particularly, and by a singular coincidence I have casts to show you, upon which I had prepared some notes to read you this evening, which bear directly upon this discussion if not quite directly upon Dr. Choquet's case.

Dr. I. B. Davenport then read the following paper:

Correction of an Under-Shutting Jaw by Raising and Jumping the Bite.

Gentlemen, I have here a case of far under-shutting of the lower teeth. I say under-shutting because it is the mandible which is at fault. The lower teeth articulate with the upper teeth one cusp too far back, and the lower incisors bite rather deeply into the soft parts of the roof of the mouth. When the patient bites forward into what should be the normal position, the back teeth cannot strike, and are quite wide apart, but the deformity of the face is corrected.

One month prior to the writing of this report (January 29, 1901) I placed a simple plate inside the upper arch, arranged in such a way that the lower front teeth bit upon the plate and left all the other teeth wide apart and without antagonism. A gold ring near the front of the plate prevented the teeth biting in any other than the forward position. The ring acts as an inclined plane to guide the mandible into the correct position, and is much less cumbersome in the mouth than the old-fashioned inclined plane of rubber and metal. This use of the ring instead of the inclined plane, which was first employed by Dr. W. S. Davenport, I can assure you is a good appliance for such cases. Inside of one month after the placing of the plate I was surprised to find that the molars had so elongated that they were in contact even with the plate in the mouth. The jaws had taken their normal positions, and the patient could not bite in any other way, even with the plate out of the mouth, as the molars now were in the way when attempt was made to bite otherwise and the lower front teeth were far away from the upper gums.

The only surprising thing is the rapidity of the result. The patient in this case was eleven and one-half years of age, and the second fourteen years.

Another point I wish to emphasize is that the time to begin regulation of the teeth depends upon circumstances. I am finding more and more cases where rather early regulation (even before three years old, in one case) is better than to wait, according to a common belief, until all the deciduous teeth have been replaced and the bicuspids fully developed.

At a previous meeting Dr. Bogue in speaking upon the question of jumping the bite, made the following remarks: Lately the question of jumping the bite has been brought forward again, and I venture to speak of it now because I notice a misunderstanding of terms.

The bite is the occlusion of the ends of the tooth. It is the way the teeth strike together which determines whether there is anything wrong with the bite. If you change the striking of the teeth so that the teeth of one jaw strike the teeth of the other jaw either one cusp farther forward or back, the bite has been changed. Some have denied the possibility of doing this. Others say it is possible, but only by an advance of the mandible as a whole, and its permanence being dependent upon modification of the temporomaxillary articulation. I have certainly permanently jumped the bite; how it has been done is about in this way: Sometimes as a preliminary and necessary requirement of these cases both arches have been spread and the teeth in each consequently loosened up and all capable of some deviation or accommodation. Now suppose they are made to bite in a new position, and prevented from biting in the old position by a mutual accommodation to each other they settle back into a new and fixed position. This has been effected not by one great change in the joint, or by a change in the shape of the ramus, or merely by a change in the position of the socket, but by a combination of forces —a readaptation of the articulating surfaces due to many factors.

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Meeting of March 28, 1901.

The American Dental Club of Paris held its regular meeting at the Automobile Club on March 28, 1901.

The meeting was preceded by a dinner in honor of Prof. W. D. Miller of Berlin and Dr. N. S. Jenkins of Dresden.

Dr. Miller presented a large number of most beautifully prepared sections of teeth and jaws both of man and animals, some unstained and some most beautifully colored, with the tissues admirably differentiated and adapted to both microscopical and macroscopical study, many especially adapted for the lantern, thus making it possible to reproduce accurately upon the screen every shade of color present in the specimens.

Dr. Miller's presentation was most enthusiastically received by the Club and a vote of thanks was heartily passed.

(Since the above presentation a large number of Dr. Miller's slides have been illustrated and fully described in the Dental Cosmos for October 1901, to which the reader is referred.)

Dr. Jenkins then made a short address on the subject of porcelain for inlay work.

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Meeting of October 1901.

The American Dental Club of Paris held a special meeting at the Automobile Club, to meet Dr. L. C. Bryan, after a dinner at the same place given by the Club in his honor.

Dr. I. B. Davenport occupied the chair, and there were present the following members: Drs. I. B. Davenport, W. S. Davenport, Da Silva, Crane, Bryan, Younger, Daboll, Wetzel, Hirschfeld, Hugenschmidt, Conrath, Roussel, Hayes, and Brigiotti.

Immediate Correction of Malposed Teeth.

Dr. Bryan. I will allude to some points in my method of immediate correction of malposed teeth, and then the principal part of the entertainment will be looking at the casts.

In April of this year, at the last meeting of the American Dental Society of Europe, I read a paper which contained about all I want to say on this subject. You will find it in the *Dental Review*, and I will confine myself to presenting the casts. The society having been unable to find a patient, I am not able to operate now.

The first publication I believe in regard to this operation was the article read before the A. D. S. E., in Basle, in August 1892, and that paper was published in the *Dental Review* of November 1892. I had sent my paper to Dr. Cunningham in England to prepare something for opening the discussion in Heidelberg in 1891. He wrote a paper on the same subject in 1893 at the World's Congress.

Dr. Röse has called my attention to the fact that Fauchard, in Paris (1728),

performed this operation with the old key or pelican, probably without any sawing of the alveolus or modern methods of antiseptic treatment. To give a short description of the preparations before operating, I will say they consist in cleansing the mouth and parts to be operated upon with a thoroughly applied antiseptic wash. The preparing of a vulcanite plate, fitting over the jaw, teeth and gums follows. Out of this plate is cut a groove exposing the tooth to be operated on, and running in the direction in which the tooth is to be moved. Over the point where the tooth will come with its thick wall of alveolus, during the regulation, an eminence is made on the cast by the addition of extra plaster before the wax model of the plate is adjusted. A brace of steel or brass is placed over this eminence. When the wax plate is prepared with its brace, the forceps are adjusted to the cast and the outer beak which rests over the brace is embedded in the wax, to make a solid retaining place for this beak of the forceps during the operation. The rubber plate is now made after the wax model.

With one of the saws which I herewith present, one being my own pattern and one Dr. Cunningham's, parallel cuts in the alveolus are made on either side of the tooth to be regulated. Should there be any divergence of these lines from a parallel, let the broader space be on the outside of the jaw, in the direction in which the tooth is to be moved, so that this block of alveolus with its inclosed tooth will not wedge in. The operation of sawing is done painlessly by the injection of a local anesthetic in the region to be operated on, either three to five per cent. cocain solution or some of the numerous local anesthetics used in connection with the extraction of teeth. Make four slight injections; let the gum puff out. Be careful not to get any systemic effects, and one will find in this case, as well as in all cases of regulating, if the old methods be used, a remarkable ease of operation and the alveolus can be sawed right through. There is a remarkable freedom from pain. The saw I have used is rather fine-toothed; it should be much coarser. Formerly I used a spray of ether or ethyl chlorid which works well in some cases, but the best plan is to inject a cocain solution.

I used cocain with a patient last week in Berne and he assured those present that the operation was entirely painless except for the prick of the hypodermic needle. For the retention of the tooth all that is necessary is to make the parts dry. Run a double figure-of-eight of silk thread on the tooth regulated and the adjoining ones after sponging them with sandarac, and cover the threads on both sides and the interdental spaces with a soft phosphate cement, allowing it to harden on the ligatures. This prevents the slipping of the threads into the gum tissue and holds the tooth for a few days when it will be found firmly and fairly fixed in its new position.

This is a humane operation, although I seldom see a dentist who is not shocked at the apparent brutality of it until he has seen it performed. You will be surprised to see the painless manner in which the alveolus can be cut, sawing directly through the gum into the heavy margin of the alveolus. It is not necessary to cut deeply or to the apex of the root, as the great resistance of the alveolus is on its margin, and this margin being cut through, the tooth moves readily in the direction in which force is applied, through the soft cellular tissues of the maxilla. Strange to say, in all my experience, I have never operated on the mandible, but I see no difficulties in doing this, although the outer walls of the mandible are stronger than those of the maxilla, and probably more force would have to be used.

I find that the best ideas of this operation are to be obtained by allowing the members to ask questions which cannot all be covered in the body of the paper, and I invite the members to ask for information on any points not touched on in this short *résumé*. I believe you are all familiar with the operation as I used to perform it, and my only excuse for coming before you today to talk on this much-discussed subject is that I have two improvements on the first method of

operating—the new forceps and the rubber splint—which make it practically in its modified form a new operation. The difficulty with the ordinary forceps is that the tooth is liable to go into its place with a shock. The simple steel bar with its soft rubber lining which I first used, and on which the outer beak of the forceps rested as a fulcrum, I find very unstable and unsatisfactory, and it causes a great deal of slipping and uncertainty of movement.

The forceps which I present are the result of several years' study to secure something which would be entirely under control in moving teeth. You will see that it is the double cog-wheel arrangement in both forceps, the jaw being drawn together with the turn of a convenient handle, one jaw resting in a socket and the other moving in the groove in the plate; the instrument is entirely under control and the tooth moves slowly and steadily into its place without a shock. These instruments are at the service of any of the members who may care to examine them and I shall be very glad of any suggestions on the subject. This is the first forceps I made just before the Cologne meeting. You see the movement is entirely under control, the cog-wheel reversible. This is only interesting to you as a novelty.

Dr. W. S. Davenport. But in a case where you have to allow for space to permit the two or three teeth to come into place?

Dr. Bryan. I should not regulate teeth where there was not sufficient space for them to come out—I should not then attempt to regulate teeth with a splint. In one case I wedged the teeth apart.

Dr. W. S. Davenport. I have used Cunningham's saws—they are very narrow and can be slipped between the teeth. I inject a one per cent. solution of cocain in about ten places.

Dr. Younger. Do you ever have any trouble with the small particles which occur as a result of sawing—small particles of bone?

Dr. Bryan. No, I have never had any trouble at all.

Dr. W. S. Davenport. I was speaking to a surgeon about this the other day and asked him the very same question. He has assisted me in giving cocain. I asked what happened to the "sawdust," as we might call it. He says that it is healthy bone-cell and is simply absorbed in a short time.

Dr. Bryan. Yes, Dr. Atkinson used to say that, and he never cleared out the alveolus; but I think differently. He claimed that it was used up in the usual process of repair.

Dr. W. S. Davenport. We know that if it is necrosed it is thrown off. But in the case of healthy bone tissue it appears it is absorbed. The man I am speaking of is a very able surgeon. He is working with Doyen every day, using strong dental revolving engines and all kinds of machinery. He says if it is healthy tissue it is absorbed.

Dr. Younger. I think the saw used being so fine, the particles would be very minute and consequently they might very well be absorbed.

Dr. W. S. Davenport. I found the teeth of the Cunningham saw too fine and I made them three times as large by use of a file. I sawed up between several teeth and moved them all forward in one case. Naturally there was a lot of débris in there. I sawed as high as I could go, and two days after the operation the tissues had healed up perfectly—there was no suppuration.

Dr. Crane. Did you use cocain?

Dr. Davenport. Yes; the surgeon I was speaking of just now is most useful to me, in fact I could not do without him. He will come with sterilized cocain and inject it. He injects one per cent. and as much as he likes; the first injection is painful, but it does not take him five minutes to make several injections and produce complete anesthesia.

Dr. Da Silva. Years ago they used a six per cent. to eight per cent. solution.

Dr. Younger. I use a thirty-three per cent.

Dr. Da Silva. If you injected that you would have a corpse!

Dr. Younger. For nearly fifteen years past I have used an injection of

this strength in implantations and extractions and have never yet had the slightest trouble. Of course I am exceedingly careful, only injecting from a thirtieth to a fifteenth of a drop at a time. In pyorrhea no injection into the tissue is necessary; it is poured into the pocket and only affects the surface. It does not pass into the circulation.

Dr. HUGENSCHMIDT. One per cent. is the right method. Doyen has done 10,000 operations with cocain, and never had an accident. He only gives it, as a rule, in operations in a horizontal position and keeps to that position for three hours. If the patient is allowed to rise he is likely to have syncope.

Dr. YOUNGER. It makes a great difference into what tissue cocain is injected and the amount of territory intended to be anesthetized. The gum, like all dense fibrous tissues, has very limited absorbent qualities and has to be impressed by the strength of the solution. We have not only to contend with the lack of diffusibility in the gum tissue but with the blood current, which not only weakens the solution but carries the greater portion of it away upon the removal of the hypodermic point. Therefore, the solution necessary in implantation and pyorrhea must be exceptionally strong. But as the field of our operation is contracted, so the amount employed is minute. With my solution you can inject the thirtieth of a drop at a time locally. It affects the immediate tissue only. The patients seldom know they have had cocain.

Dr. W. S. DAVENPORT. Where do you inject it? Into the gum?

Dr. YOUNGER. Yes.

Dr. W. S. DAVENPORT. And for pyorrhea, in the pocket?

Dr. YOUNGER. Yes.

Dr. W. S. DAVENPORT. That is external.

Dr. YOUNGER. Yes, the injection seems to be localized and does not pass into the system. Its effect is entirely superficial and is not carried into the circulation. But it is not the strength of the solution so much as the amount of cocain injected that has to be regarded. The bulk of liquid employed by Dr. Doyen no doubt contained more cocain than in the minute quantity as employed by myself—for from one-half a drop to three drops I usually find quite enough.

Dr. HUGENSCHMIDT. You inject solely into the part where it becomes white on pressure?

Dr. YOUNGER. The minute quantity injected at a time rarely produces the pressure necessary to blanch the gum. I have never had any accident.

Dr. CRANE proposed a vote of thanks to Dr. Bryan, which was unanimously carried.

MEETING OF NOVEMBER 2, 1901.

The American Dental Club of Paris met at the office of Dr. Daboll November 2, 1901, for its annual meeting and election of officers, with the following result: Dr. Daboll, president; Dr. Crane, vice-president; Dr. Hayes, recording secretary; Dr. W. S. Davenport, treasurer; Dr. Levett, corresponding secretary; Drs. Younger and W. S. Davenport, members of the executive committee; Dr. Da Silva, chairman of the executive committee (elected previously); Dr. I. B. Davenport, editor.

By unanimous resolution of the Club Dr. E. A. Bogue and Dr. W. H. Barrett, who owing to removal from Paris cease to be active members, were honored by being made associate members, with total remission of all future dues.

After the elections the retiring president, Dr. I. B. DAVENPORT, made the following remarks:

My dear fellow-members: Before retiring from the chair I beg to most sincerely thank you all for the hearty support you have given the Club during the past year as evidenced by the large attendance and general interest manifested. I would particularly express our thanks and appreciation to Dr. Crane, our beloved and worthy secretary, for not only his most valuable services, but also for having so kindly come to the Club's rescue at a moment when it was difficult to fill the office, thus accepting much hard work which he might very justly have

shirked. To Dr. Da Silva also we owe much of the success of the past year, for he has really had all the work of the Executive Committee to perform alone. He has always found himself equal to all emergencies and richly deserves our thanks.

If during the past year the Club has not made a dazzling scientific record, it has done good work in the general mutual interchange of views which always brings a betterment of our work and consequent greater benefit to humanity. It was no mean event when Dr. Miller and Dr. Jenkins favored us with their presence and the results of their work, and again, later, when Dr. Bryan exhibited to us his most ingenious appliances and explained his particular operation for correction of irregularities.

At the farewell dinners of Dr. Bogue and Dr. Barrett we laughed and wept together. We have joined our French *confrères* to do honor at the tomb of that good man Dr. Lecaudey, and we have joined with them to fête the Government recognition of dentistry at the time of the decoration of Mons. Viau.

We have feasted well and often together, and we love each other better. We have had peace. Thank God! Thank you all!

I have the honor of vacating the chair in favor of my most worthy successor, Dr. Daboll. Let us give him our best support.

Dr. Daboll upon taking the chair thanked the Club in a few well-chosen words for the honor again conferred upon him.

Dr. Younger proposed a vote of thanks for the retiring officers, which was duly passed.

Meeting of February 1902.

The regular monthly meeting of the American Dental Club of Paris was held February 1, 1902, at the office of Dr. Burt; Dr. Daboll, the president, being in the chair. On the conclusion of a few remarks by the president,

Dr. I. B. Davenport made the following remarks:

Mr. President, I show an upper left central incisor containing a very large filling and just as it was brought to me January 6th by the patient soon after breaking it off by biting upon a bone. The gold and platinum filling which restores nearly one-third of the entire crown, including the entire labial surface and fully two-fifths of the biting edge, I inserted February 16, 1887. This was built on an old copper amalgam filling—which is still, as you see, in perfect condition, and which I made under the gum at the palatal surface October 24, 1885, as a patch of an old filling made by a former dentist. The latter-mentioned filling had fallen out and was replaced by the platinum and gold, as you see, using the amalgam filling as a foundation to build upon.

The patient had previously lost the following teeth: From the maxilla, all the molars of the right side—the left second molar, and left second bicuspid. From the mandible the right first molar and the left first and second molars. The consequence is that enormous strain has been brought upon the front teeth, and all these years this filling has been directly bitten upon. Only one little repair was needed during the time, and that at the point of contact of the amalgam with the gold—done in October 1892. Although these fillings extended so high under the gum and cut the tooth at the center, the tooth broke off at a higher point, leaving the filling intact and the pulp alive and unexposed.

I expected to find the pulp devitalized, but in probing for the canal preparatory to crowning the root, I broke through the thin covering of dentin into the living pulp, which I at once painlessly removed after applying cocain under pressure.

Dr. G. C. Daboll then read a paper upon the bleaching of teeth by use of twenty-five per cent. pyrozone, as follows:

Bleaching Teeth.

When I had been in practice about ten years I had my first case of tooth-bleaching—two upper incisors, central and

lateral. The cause of the discoloration was the death of the pulps and consequent infiltration of the dentinal tubes with decomposed pulp tissue. At that date but little was generally known or done with discolored teeth. A few men had had a small measure of success, but it was considered by the mass of the profession as a doubtful practice and rarely successful or durable in its results. My patient was a young lady, and these teeth had long been a source of mortification to her and naturally she was anxious to have me try and only too willing to submit to any inconvenience or trouble that would improve her personal appearance. It was shortly after my removal to Buffalo, and I was yearning to do something out of the ordinary that would make my reputation. I was young and ambitious and had that sublime confidence in myself that admitted of no prevision of disaster. I consented to make the trial. The best authorities I could find considered potassium cyanid the surest bleaching agent known in its action on discolored dentin. I procured some and made my first essay on the central. This was before the advent of rubber dams, and the most serious part of my problem was to protect the soft tissues from the poison, which involved a care that did not admit of a moment's respite. I was fortunate, and succeeded excellently well—to the delight of my patient and my own great satisfaction—and I commenced operations on the lateral with great confidence, proceeding exactly as with the central—opening freely into the pulp-chamber, filling the pulp-canal most carefully and omitting none of the precautions I had observed with the first.

All went well until the third sitting. The morning after, the patient presented herself at an early hour with the liveliest case of inflammation of the pericementum I had ever seen. In spite of all my care the millionth part of a drop of the solution had reached the membrane at the edge of the gum. It would be impossible to describe my feelings, but I realized at that moment why it was that all the older men in the profession were profane. I set to work to combat the mischief, and although I eventually succeeded in reducing the irritation, I have never ceased to anathematize the day I tried potassium cyanid as a bleacher.

There was so much bitter with the sweet in this my first essay that for several years I fought shy of bleaching cases. But I eventually tried a good many, confining myself to the various combinations for generating chlorin gas, then recognized as the only real bleaching agent. I had varying degrees of success but cannot say I was generally proud of the results. The difficulty of controlling the gas and keeping it in contact with the dentin a sufficient length of time to insure its penetration to the bottom of the dentinal tubes compelled me to be often satisfied with partial successes. The best results were attained with young subjects, the larger size of the tubes permitting easier and deeper penetration, and as a rule also the discoloration being of more recent origin. Cases of long standing were always more obstinate, especially in adults.

In 1882 Dr. Kirk brought to the notice of the profession a new combination, consisting of sodium sulfite and boric acid in the proportion of 100:70, generating sulfurous acid. In his experiments he found sulfurous acid quite equal to chlorin in bleaching dentin, and had the advantage of not having any disintegrating action on the tooth-substance. In my experience I found it much easier and surer to operate, as the gas is generated much slower and it could be sealed in the pulp-chamber and left for several days without apprehension of injury, and its action is quite rapid as compared with chlorin, from three to five applications being sufficient for ordinary cases. Later, I had some experience with electrical cataphoresis but cannot say I found it advantageous with hydrogen dioxid, this latter probably not being sufficiently concentrated, and my want of experience with the cataphoric apparatus being a bar to my getting the best effect.

Recently I have had a case—an upper central incisor in the mouth of a young woman of perhaps twenty-eight years of

age. The tooth was quite dark, the result of the devitalization of the pulp with arsenic, and the dead pulp being allowed to remain in the tooth for six weeks—in fact, it was there when she came under my care and I removed it *en masse*. My first care, of course, was the treatment of the root and the filling of the upper third of the pulp-canal. Then with a round bur I enlarged the canal, carrying the principal part of the cutting toward the labial aspect of the root. This was done that I might get the effect of my bleaching agent with certainty on the dentin at the upper margin of the crown —usually the most obstinate part of the tooth to yield its color. I had endeavored to procure pyrozone, but to my surprise found it was practically unknown in France, the best that I could do being oxygenated water of forty volumes. So I commenced with the sodium sulfite and boric acid and had made a second application with some improvement when I learned that Dr. Younger had just received some pyrozone in response to a cablegram to New York. He very kindly gave me a tube, and at the next sitting I bleached the tooth to its normal color and at a subsequent sitting exaggerated the effect so that it was a trifle whiter than the others, filled the root and pulp-chamber with a pure white phosphate cement and the exterior with gold. This was my first experience with pyrozone as a bleaching agent and it may interest you to know how I proceeded with it. As a matter of convenience in the first instance, I applied the rubber dam, and in the second instance as a matter of precaution—pyrozone being a powerful caustic in contact with the mucous membrane. I then saturated a pledget of cotton large enough to fill the cavity, allowed it to remain for five minutes, and to accelerate its penetration of the tubuli I passed a hot instrument over the face of the tooth, intensifying the capillary attraction. A half hour sufficed, with three renewals of the pyrozone at the first sitting and only one application at the second. One could see the tooth gradually whiten until all trace of color disappeared.

For such cases as I have described, pyrozone must be considered *par excellence* the most effective agent known. I have not gone into details regarding the various causes of discoloration, as it is well known that in teeth discolored from metallic causes, or stained by the absorption of coloring matter contained in fluids used in treatment of pulpless roots —such as iodin—different agents must be used that from their chemical relations will have a direct bearing on the particular case. I have brought with me a tooth-shade guide that will give you an idea of the extremes in the variation of the color of the tooth I have described —No. 47 at commencement and No. 26 at completion.

Discussion.

Dr. I. B. Davenport. I can fully subscribe to the president's remarks in regard to the great utility of pyrozone as a bleaching agent. I have on several occasions employed it with most happy results. I cannot say that I have ever had much success by other treatments.

A Member. How long do you leave it in the tooth—for one or two days?

Dr. Daboll. No, it bleaches in half an hour to an hour. In half an hour I had whitened this tooth to normal. I only applied it the second day to exaggerate the effect and insure its durability.

Dr. W. S. Davenport. Was it a case of yellow or bluish discoloration?

Dr. Daboll. Bluish, and much darker at the margin of the gum than at the edge of the tooth. In bleaching, the point whitened first and gradually extended over the remainder of the tooth.

Dr. W. S. Davenport. I asked because I bleached a tooth in a similar condition at one sitting. This tooth had a bluish-gray discoloration; but when I tried it upon a yellow discoloration I had the greatest difficulty to bleach it at all.

Dr. I. B. Davenport. I tried pyrozone on dentin discolored by tobacco, but without result.

Dr. Daboll. No; because you have to deal with a deposit of carbon. Its wonderful effects are upon discolorations

due to infiltration of decomposed pulp tissue in the dentinal tubes.

Dr. Hugenschmidt. One must be careful in using pyrozone not to leave the cotton too fully saturated in the root. I have left it between two sittings, and the first time I left it I found it gave rise to a slight periostitis, and very severe pain for a while; then the pain disappeared and the tooth was of course bleached. It is an excellent disinfectant and can be used as such.

Meeting of March 1902.

The American Dental Club of Paris met March 1, 1902, at the office of Dr. Levett; Dr. Daboll, president, being in the chair.

Dr. Coën recommended for the making of crowns a metal which he had seen mentioned in the *Ohio Dental Journal*. The metal consists of twenty-two parts of pure gold and two parts of platinum. He said it was quite as pliable as pure gold or pure platinum; is strong, and shows less in the mouth than gold—having a peculiar gray color—and can be safely soldered with pure gold.

Dr. Gires presented two patients in the name of Dr. Lortal-Jacob and himself, with the following remarks:

This patient, a girl of thirteen years of age, is suffering from a syphilitic ulceration of the soft palate. This ulceration, of the size of a one-cent piece, situated on the middle and fore part of the soft palate, has a yellowish core formed of a friable magma, which easily comes off; a probe penetrates it without meeting with resistance or causing appreciable pain. Two other little ulcerations are situated some half inch behind the first-named, one at each side. These three ulcerations, first noticed a month ago, have no typical marks; one might be inclined to ascribe them to tuberculosis if a singular light were not thrown on their diagnosis by existing extra-buccal lesions.

On looking at the eyes of the little patient, you see that the eyelids are red and swollen, the conjunctivæ are congested, the corneæ are dim and present opaline milky spots. This kerato-conjunctivitis is more noticeable on the left eye than on the right one. The affection has been chronic for the last seven years with periods of improvement. The nose too is slightly deformed and flattened; the patient suffers from chronic coryza. Finally, if the examination be carried farther, an interesting deformity on the tibiæ is discovered, namely, at the junction of the inferior third with the medial third, a nodosity is located extending vertically, which, being situated on the front edge of this bone, notably increases its antero-posterior diameter and reproduces in a characteristic manner the pathological affection to which the name of "sword-blade tibia" was given by Professor Lannelongue.

This deformity appeared some three weeks ago. The kerato-conjunctivitis and the "sword-blade tibiæ" remind us of hereditary syphilis, to which likewise may be ascribed the chronic coryza, although this latter is less decidedly characteristic.

The correctness of this diagnosis is confirmed by the numerous miscarriages of the mother as well as by the antecedents of the brothers and sisters of the patient. We may then, with reason, attribute the ulceration of the soft palate to hereditary syphilis. Furthermore, the great improvement in all these lesions following the antisyphilitic treatment which was a fortnight ago commenced by Dr. Lortal-Jacob, and is still being followed out by the patient, is certainly another condition favoring this diagnosis.

My other patient is suffering from buccal hydroa. Upon examining this lady's mouth, you will see on the mucous membrane of her palate little oval erosions—simple epithelial desquamations, smooth and roseate. At first one would take them for mucous spots of syphilitic character. But, by questioning the patient it is found that this is the second time of her suffering from this buccal affection; on the first occasion—some three months ago—she was cured in three weeks without medical care. Both times the affection commenced with "little

prominent pimples which were not scratched off," absolutely painless. At the end of three weeks they disappeared and left in their place the erosions which we now see.

If we know how to interpret the patient's words, we shall conclude that there were at first little vesicles—"little pimples which were not scratched off"—which burst and left behind erosions which remind us of syphilitic manifestations. Now these are exactly the symptoms of buccal hydroa—a cutaneous disease which often attacks the mucous membrane and is difficult to diagnose when the lesion exists in the mouth only. I had hoped to be in a position to enable you to compare this affection with genuine syphilitic spots of the mucous membrane; unfortunately a third patient to whom I had given an appointment here has not come.

Dr. Gires next submitted photographs of an infant of eighteen months suffering from hereditary syphilis, whose upper central incisors presented the type of Hutchinson's tooth—a rare occurrence in the case of the deciduous teeth. Dr. Gires did not think it advisable to attach too much importance to the tooth described by Hutchinson, as it is not very well defined and can often be seen in the mouth of patients not suffering from hereditary syphilis.

Dr. Gires also presented photographs illustrating a patient suffering from cervico - maxillary - actinomycosis, which were interesting as showing how this affection might be mistaken for ordinary lesion of dental origin. He then spoke on a cast from Dr. Rodier's collection, as follows:

I present it principally on account of the upper central incisors; they have the typical shape of the Hutchinson tooth. The crowns of these teeth are shorter and smaller than normal and have the shape of a flattened ovoid, with a smooth and regular surface, presenting the aspect of a screw-driver—"dent en tournevis" as called by Professor Fournier. Their cutting edges present a crescentic curve, with the convexity upward. This special curve—the so-called Hutchinson notch at the cutting edge of the permanent upper central incisors—is, according to Dr. Hutchinson, the only symptom of hereditary syphilis found in the teeth which possesses a semeiological value. You will notice the malocclusion of the front teeth, the incisal edges of which are separated about one-fourth of an inch when the patient closes the mouth. This is, I believe, a symptom of degeneracy.

Responsibility of a Physician attending an Operation performed by a Dentist.

Dr. Da Silva. The incident I am about to relate bears upon the question of where the responsibility ends of a physician attending an operation performed by a dentist, and where the dentist's responsibility begins.

My patient, a very nervous lady having an impacted third molar, insisted upon having it extracted under chloroform and came with her physician to administer it, although I afterward found that this was his first attendance upon the patient. The doctor showed me the chloroform he had brought. I said, "Excuse me, but I don't think you have enough there." He replied that there was enough. I again said that I knew the patient and felt sure there was not enough. He insisted, however, and gave all the contents of the bottle, and of course there was no more in the house, and the patient was not entirely anesthetized. I commenced to operate, when the patient began to struggle. The long and the short of it was that owing to her struggles the instrument slipped and brought out the second molar. I threw up the patient so she could spit out the blood, and there was a click in the basin—it was the third molar; but I had done my best. Two teeth had been extracted. I said to the doctor, "It is your fault; if she had been entirely unconscious I should have only taken out the one."

The operation was performed at the patient's home. I took the second molar back to my office, prepared and filled the roots, and returned to the patient, and gradually forced it back into its place

and bandaged the mandible; but she suffered more from having that tooth put back than she would have done had the other been extracted without chloroform. I attended the patient for a week; two or three times a day she would send for me. That was two years ago. Today, although the gum has the appearance of being somewhat receded, the tooth is as solid as any in the mouth, and now whenever she comes to me we smile and think of that physician who did not give her enough chloroform.

Dr. CRANE. I had a case of extraction which cost me the loss of more than one family, and yet it was an operation I did not do myself. Ten years ago I took a mortal dislike to extraction of teeth, so on one occasion I asked a physician whom we all know and who does this work, to administer nitrous oxid and extract the tooth—a first molar. This he did, but he made the mistake of placing the forceps between the first and second molars, and extracted the two. The doctor said he had had a little accident and taken out two teeth instead of one, but would put one back. This he did, without any treatment of the root, not having any idea of the necessity of treatment of the root; but he put it back the lingual side out.

Well, the child suffered terribly and I was asked to come to the house and see the patient. I saw what had happened and removed the tooth with my fingers, giving immediate relief.

The family, however, considered me responsible and I never saw any of them again as patients.

IMPLANTATION.

Dr. WETZEL spoke on this subject as follows: Dr. Da Silva's case turned out very successfully. Ten years ago much was written about implantation of teeth. All the articles recorded success in that line. My brother had two enormous fillings to be done in his own mouth, the second bicuspid and the first molar; he had no time to separate the teeth as he was leaving immediately for America I wanted to do a good operation which the Americans could not criticize, and as implantation was said to be such a success I thought I might try it upon my brother. Sometimes you treat a patient and think you have been successful but cannot be sure, as you lose sight of the patient; but I felt pretty sure of seeing my brother again and could watch the case. So I took out the first molar and filled the tremendous cavity out of the mouth. The bicuspid I filled in the mouth; then I replaced the first molar. My brother passed a fearful night; but the tooth got well, and when he showed it to the profession in America nobody could tell which tooth was the implanted one. After five or six years, however, the gum commenced to recede, and after eight years he removed the tooth himself; so I think that implantations are really not worth performing, since they are so painful.

Dr. ROBINSON. In regard to Dr. Da Silva's case I do not think I would have operated for a woman under these conditions. First, in nine cases out of ten the fact of a patient requiring chloroform for an extraction is indicative of the patient being of an extremely nervous nature. To extract a tooth for a patient only half or three-quarters under chloroform is to invite syncope through fear. If a patient half anesthetized under chloroform realizes that the operation is about to begin, and is unable to speak, in nine cases out of ten a complete collapse will occur.

The PRESIDENT. I had one case of accident of this kind many years ago. A boy fourteen years of age had a lower left first molar that had to be extracted. The decay had gone so far that the bicuspid had crowded into the decayed approximal surface, so that it was questionable whether the tooth could be removed singly. I made up my mind to loosen it without disturbing the bicuspid, but it came out earlier than I expected and the bicuspid with it. I just arranged that bicuspid and put it back in fifteen minutes; he never knew it had been out at all. I saw him again ten years afterward. The tooth was as good as ever. The cases of reimplantation of molars

are very difficult, but the single-rooted teeth are very easy to reimplant. If I have to treat an alveolar abscess upon the lower incisors, where the canals are so small, I prefer to take the tooth right out, prepare it and then reimplant it.

In the '60s I was in an office where I used to give chloroform three and four times a day to people for whom we were making artificial sets—it was in the days when people who had one or two bad teeth wanted to have a new set—and I gave chloroform three and four times a day for a week running. Of course some cases were more difficult than others, but if you have pure chloroform and it is given carefully I think it is just as safe as any other anesthetic. I personally never had an accident with chloroform.

Dr. Lozare. Perhaps if I were to take the stand of the physician mentioned by Dr. Da Silva I should say that I would have absolutely refused to allow the patient to be operated on in that condition, because during this stage of excitement, through fear the syncopal attacks are very imminent. I remember once giving an anesthetic for an old surgeon who had a small operation to perform. I gave it rather timidly, and during the stage of excitement the surgeon began to operate and ordered me to throw on more of the anesthetic. I did so, the patient struggling, taking deep breaths, inhaled a very large dose of chloroform, and a syncopal attack came on; it took us fifteen minutes to bring him round. When it comes to operating in the mouth with the patient struggling, aside from the accidents which might have occurred through the position of the patient, I think it altogether explainable that one innocent tooth should have been taken out with the bad one. If the physician comes in to give the anesthetic I think he should bear all the responsibility or none. I would refuse to give it under any other condition. Those anesthetics I have seen given on the Continent have been given too rashly. The duty of the anesthetizer is second to none except that of the operator himself, and it is the habit of most surgeons in big hospitals to trust their anesthetics to young and inexperienced men, with the result that a great many accidents occur which might undoubtedly be avoided.

Dr. Da Silva. In my case the patient was anesthetized, and it was only when I commenced operating that the struggling began. In the case you mention, you administered more anesthetic, but in my case there was no more to be given. It was a question of beginning the anesthesia again or postponing the operation altogether. The patient was a most difficult one, and we decided to begin. She did not wake up, but was not completely under the effects of the chloroform—only sufficiently gone to allow us to begin. It was then that she commenced kicking; the chances of syncope in that case were greatly lessened.

Somnoform.

Dr. Robinson. At the present time I am very deeply interested in every way in a new anesthetic which is being employed extensively in Bordeaux. Last Thursday from nine to twelve o'clock there were three chairs in which were studied thirty-three, twenty-two, and twenty patients respectively. It seems to me that in the future to give chloroform for the extraction of eight or nine teeth will be like calling a battery of artillery to shoot flies off a stable door. Dr. Rolland of Bordeaux has a preparation of 60 per cent. ethyl chlorid, 35 per cent. ethyl bromid, and 5 per cent. methyl bromid, which he presents under the name of somnoform. The first presentation was at the meeting at Ajaccio; he is now at his 3400th case. The most elementary precautions are discarded. No lady need be requested to loosen anything. The youngest patient treated on Thursday was four and the oldest eighty—all kinds of temperaments and all conditions of health, and with the exception of two or three who screamed, as they would have done under any anesthetic, everything passed off in the most excellent manner. I take this anesthetic with the greatest ease. Eighteen seconds is the longest time necessary to induce anesthesia. The patient is requested to breathe freely. A

handkerchief is folded around a paper cornet. At the bottom of the cornet a piece of cotton wool is placed and upon it 5 cc. of the anesthetic is squirted. The handkerchief is then placed upon the face. The patient is asked to open his eyes and to look at the operator. The eyes roll, then become fixed—there is no pallor, no blackening of the face, the features do not seem to change, and when the real state of anesthesia has passed there is a condition of analgesia during which period the operation can be continued without the slightest inconvenience to the patient. I assure you it was heartrending to see the way some of those patients were treated by the students—yet not one of them said he had suffered in any manner at all. The general anesthetic condition lasts one and a quarter to one and a half minutes. If the patient is returning to consciousness, as occurred in several cases where fruitless efforts were made to extract, Dr. Rolland just applied a little more somnoform on the handkerchief and placed it on the face again.

Dr. Levett. Nevertheless, I should say it was unwise to discard all precautions, as you say, for one is really never safe with anesthetics.

Dr. Robinson. I do not think there is any other anesthetic with which the elementary precautions can be discarded as with this. It seems absolutely safe.

Dr. Robinson then introduced Dr. Rolland of Bordeaux, who spoke as follows:

The desideratum in dental anesthetics was to obtain an anesthetic not repugnant to the patient, one that should give him freedom from pain, but not by inflicting on him another kind of pain. To employ chloroform, as says Dr. Robinson, is to call in a battery of artillery to shoot flies off a stable door. A heavy apparatus is required for nitrous oxid gas, and moreover it transforms the color of the face so that it creates a painful impression on the assistants and on the people who accompany the patient. We needed an anesthetic which could be given rapidly, which should not cause painful impressions on beholders, and which should be satisfactory, and leaving no discomfort after the awakening. I thought of a mixture of ethyl chlorid 60 per cent., methyl chlorid 35 per cent., ethyl bromid 5 per cent. The ethyl chlorid evaporates at 10° or 12° C.; but to obtain an immediate anesthesia, we wanted something more diffusible, so we thought of the addition of methyl chlorid, which evaporates at 23 degrees below zero, and of methyl bromid.

It was in this way that I constituted this anesthetic. I wanted an anesthetic which should anesthetize my patients at once; I wanted a sufficiently long anesthesia, but by an agent which should be eliminated rapidly, so that the patient should be able to go away in half an hour and not have to be carried away on a stretcher. Consequently I studied the respiratory, circulatory, and nervous systems. We breathe sixteen to twenty times per minute. In sixteen to twenty times per minute we take into the pulmonary surface a certain quantity of air which frees itself of oxygen, which saturates the hemoglobin and drives out the carbonic acid. I had to find an anesthetic which could displace the oxygen and attract a sufficiently large quantity of the hemoglobin of the corpuscle to form a satisfactory combination. But the corpuscle takes thirty-five seconds to travel from the left ventricle to the right ventricle. It is arterial and active at first, whereas during the latter half of its course it is venous. During twelve seconds of its course the corpuscle must be in combination with the anesthetic vapor to produce anesthesia; and it is thus that by our mixture a person who breathes profoundly should be anesthetized in twelve seconds. If this does not occur in the experiments, it is because when the patient begins to breathe, as he breathes a gas which being foreign to the mucous membrane and lungs, he remains for a certain time without breathing, which time must not be taken into account; but after the patient begins to breathe actively, within a period of twelve to sixteen seconds he should be asleep.

When the patient begins to breathe the anesthetic, and the vapors penetrate into

the interior of the organism, they act only on the nervous system. There is a period of excitement, of restlessness—a period of collapse, of death. But define how the excitation occurs?—that we cannot do. You will all admit that it will be a long time before we can explain it. However, the nervous system is excited. Instead of receiving the oxygen necessary for its existence it receives another gas and it defends itself, producing in this way cerebral excitement. When the person breathes he begins by the phase of excitement, the delirium, which is ruled by fear, or by the suggestion given to the person at the onset of the administration. I had been called in for an obstetric case—to deal with one who was much frightened. I had brought some somnoform with me and I began to anesthetize her; as I was doing so I said roughly: "Think of something gay!" She was going off, but said "Of what?" I said "Think of the fair!" Now the fair at Bordeaux is a great institution; everyone goes to it and consequently it is considered a very agreeable diversion. She went under the anesthetic; I performed the operation, which lasted a quarter of an hour; she woke when all was over and said it was very curious she had been to the fair and had sung a popular song, and during all the time I was operating she had been at the fair. Others are differently affected, some take up a defensive attitude and are ready to fight the assistants who are giving the anesthetic. Others again have religious delirium. One patient declared on waking that he had seen irrefutable proofs of the existence of God. Eight days later we anesthetized him again and he said he saw irrefutable proofs that the miracles at Lourdes are real. Some persons declare that they suffer a certain degree of excitement during the following day, but I have only found this to be the case in 1 or 2 per cent. of cases.

I have never observed a syncope or an accident; only once or twice has there been any vomiting in 3000 cases. Little children and nervous young girls take it without any difficulty. We have often long and difficult operations to perform at the École Dentaire; one, for instance, was that of a person who had had gangrene of the cheek. A portion of the mucous membrane had disappeared, also part of the lips, so that her jaws were permanently drawn up and the teeth were in rigid occlusion, and as she had lost several teeth she was constantly biting her tongue and was frequently in great pain. That was a very difficult operation to carry through—a mouth which could not be opened, jaws which could not be separated. I put that person to sleep about fifteen times; at one sitting she took a bottle and a half of somnoform. She came back and began again. The people around were quite enervated. I managed to keep her asleep for twenty minutes. I thought therefore that I could use the anesthetic for longer operations. I began the experiments on a guinea-pig, which I kept asleep for an hour, and then I tried it on a series of animals for periods of three and four days. A cat which had had its hips broken by a dog, I anesthetized for eight hours, then killed it purposely. I think I am therefore justified in saying that in it we have a safe and easy anesthetic which will be very useful in all kinds of operations. I have given it for surgeons performing nephrectomy and operations on the interior of the bladder, and I have demonstrated it in all the clinics of Bordeaux with excellent results in every case. I think there need be no anxiety as to its effects. Personally I have tried it on 4000 cases. The first advantage it affords is that the accidents determined by the irritation of the buccal mucous membrane do not occur. There is in anesthesia an irritation which acts on the larynx specially, and a cardiac reflex is to be feared. When using this product we need not fear the effects of this irritation; as this substance is not caustic.

In anesthesia we have suppressed action of the brain, but we still live because the bulbous portion is not affected. But with a substance which eliminates itself so rapidly as does somnoform all danger is avoided. It leaves no after-effects. A person who has been chloroformed continues to vomit often for days after the

operation; with our anesthetic there is no vomiting.

To say no accidents can happen is a thing no one can assert. You cannot say that a patient will have no syncope when there are persons who will have a syncope merely through fear, or a person may have brain lesions and a fatality may occur. You cannot help that: it might have happened in a hairdresser's shop as well.

As for the effects on cases where we have heart disease, we have studied this phase particularly. The effects of somnoform do not modify, or modify very slightly the blood pressure; consequently there can be no danger in using it. That is not saying that no fatality may occur. In a lesion of the heart the patient runs a risk while sitting at table or going up stairs just as much as when in the dentist's office. But I have often had to give chloroform and have never had an accident. I do not therefore say none can happen, but I do think that most of those which occur are produced by carelessness on the part of the anesthetist. This has been proved, and there appeared in an English journal a statement that during a course of experiments with anesthetics at Hyderabad, India, it was noticed that breathing ceases generally five minutes before the heart's action stops. Therefore if we have a case of cardiac syncope, the patient ceases to breathe five minutes before the cardiac paralysis occurs. An anesthetist must be very careless not to notice the arrest of breathing and take measures to prevent a fatality.

Dr. Robinson. I should just like to add a few words to what Dr. Rolland has so ably said tonight. I think somnoform has an immense virtue: it gives the patient a desire to re-submit to the anesthetic. One of the great disadvantages of chloroform on the contrary is the disgust it induces and the nausea following. The different people who took the somnoform this afternoon all came to the chair afterward as spectators to see the next person worked upon and they found it amusing. I particularly asked each one of them if they were ready to start on again, everyone answered: "With the greatest of pleasure." They had no fear, dread, or painful impressions remaining behind. I have no hesitation in saying that of all the people to whom I have given it not one would dream of having a tooth extracted in the future without taking it. The effect of this somnoform is twofold: first we have complete anesthesia; after about twenty-five to forty seconds this complete state disappears and we have an analgesic condition during which the patients give signs of consciousness—some groan, some move, some scream—yet in spite of some most difficult cases this afternoon, none of the patients felt anything, and in one case especially, in which Dr. Da Silva operated in a marvelous fashion, taking two and a half minutes for four most difficult roots, he succeeded most wonderfully,—yet when I questioned the woman after she came round, to know whether she had felt anything or not, the reply was "No." Like all anesthetics, it is a question of the more you employ the greater the danger. The great advantage is that the patient goes off to sleep quietly and regains consciousness quietly. One girl this afternoon certainly showed signs of syncope, but I just gave her two slaps on the side of the head and she recovered at once.

Dr. Lozare. It is not only the chloroform that is the danger, but the shock to the nervous system during the excitation —the syncope through fear.

Dr. Da Silva. The patient was not sufficiently awake to feel fear. The great dread is at the moment you put the mask on to give the chloroform. Some will take it as they will drink a glass of water, others would rather be cut up into pieces. One great charm of this new anesthetic is that the patient's color is not changed.

Meeting of October 1903.

The American Dental Club of Paris met on October 3d, the president in the chair.

Dr. Wm. Hirschfeld read a paper en-

titled "Professor Sachs' Method of Gold Filling," as follows:

Professor Sachs' Method of Gold Filling.

Mr. President and gentlemen, it seems almost like an imposition to treat the subject of gold filling before this society—a subject which every one of you is so familiar with that any new feature in this line appears impossible to discover. But I want to present you this evening the views of a practitioner who occupies in all German-speaking countries such a prominent place as a gold-filler, who has done and does yet so much for the advancement of American dentistry that his methods may appear of interest even to you Americans.

As long as I have known Dr. Sachs—and I speak now of a period of over twenty-five years—his great aim in operative dentistry has been to combine conscientiousness with rapid work. It is a fact that a gold filling done to our own satisfaction requires even under the most favorable conditions a certain amount of time, and that the so-called saving of time means generally the leaving undone of details which are really necessary for the conservation of the tooth. However great these difficulties are to the operator, Dr. Sachs has overcome them to a great extent. And this leads me precisely to the point from which I want you to look in this essay, not to discover something actually "unknown" in this method, but to show you what a dentist can do by judicious selection of his instruments and his gold to reduce the making of a gold filling to strictly necessary limits.

Let me pass quickly over the preparation of the cavity; nothing of especial interest to you can be related here, except perhaps the immense importance which Dr. Sachs lays on perfectly smooth edges without sharp angles. He also is careful in putting on the rubber dam before commencing the preparation of the cavity, and this he does with the hope that dryness of the tooth, and the use of sharp instruments will do more for painless operating than any amount of preliminary dressings. The cavity itself is prepared if possible without undercuts, grooves, or retaining-points, so as not to weaken the tooth in such places. His idea of retaining a filling is to obtain four parallel walls, or, if that is not possible, to shape the tooth so that the orifice should be less wide than the floor. Now being once absolutely sure that the cavity is prepared in such a way as to prevent the future filling from ever dropping out, he proceeds to the packing of the gold.

This part of the operation, Dr. Sachs divides into three distinct phases: (1) The lining of the cavity with soft gold; (2) The establishing of the gold body with specially prepared gold ropes, and (3) The final building up to the top by means of a peculiarly formed adhesive gold.

Although almost any kind of gold is supposed to produce good results in the hands of an experienced operator, Dr. Sachs uses soft gold for the lining of the cavity. It is sufficiently tough not to be pierced by the instrument, and still soft enough to afford a perfect adaptation to the cavity. Dr. Sachs cannot lay weight enough on the fact that soft gold is the only proper material to prevent future decay, and for this reason he is more than careful that nothing but soft non-cohesive gold should come in contact with the tooth-substance.

The instruments to be used for this part of the filling are exclusively hand pluggers. Dr. Sachs has devised a set of six double-ended pluggers, which I want you to examine. You will notice first of all that the handles are of vulcanite and thick enough not to fatigue the hand. The object of the different colors of the rubber is that you recognize instantly just the one you need. You will see that nearly all have corkscrew points, as these forms are the most convenient to get the gold easily into any corner of the cavity, but beside these six Dr. Sachs has designed a special plugger for rapidly filling large upper crown cavities. You can imagine what force you can develop with it, by placing it into the inside of your hand.

It is with these seven instruments that he performs the entire lining of the cavity with soft cylinders. In deep defects he would first cover the floor with a few suitable pieces before lining the walls, or, if the neighborhood of the pulp would present danger of future trouble, he would line it with cement and commence the packing of the gold only as soon as the cement becomes perfectly hard. I may add that in starting a filling he uses frequently in his left hand a pointed excavator to keep the piece firm while working it into place with the hand instrument.

As soon as the filling has advanced sufficiently—I mean as soon as all the walls of the cavity are well covered with soft gold, being very particular that this should freely overlap the borders—then only, he proceeds to the second part of the filling, the use of the cohesive gold. This could easily be done by simply continuing with the same cylinders, made cohesive by heating; but to establish a perfect union between the soft lining and the future cover, Dr. Sachs continues with White's gold foil, No. 4, which he prepares in the following manner: He cuts a sheet of foil into four or five strips of about one centimeter in width; these strips he places together on the rubber of his gold roller. By gentle rolling he obtains a gold roll which he cuts into pieces of suitable size. These are the pellets which he uses by heating to form the inside of the filling. He condenses them first by hand pressure and finally with broad mallet-pluggers of about the same form as hand instruments, only sufficiently longer and made for the hand mallet. The points of these are not serrated, as he finds that even polished tops will give a more perfect adherence between the different pellets.

Instead of these gold rolls he uses in very large cavities crystal gold, condensed by strong hand pressure, always very careful that none of the crystals should ever be exposed to the final surface.

When the cavity is filled up that way to about two-thirds of the necessary size he finishes the filling with pellets of thick foil prepared by him in a most original way.

He is of the opinion that gold foil, especially the thick number, will produce the hardest and most solid surface for a finished filling—a surface which will not get rough or pitted after some time. But as the heavy foils do not have the same adherence as the thin numbers, he conceived the idea of uniting the two kinds, and, gentlemen, you will be surprised to see with what good result you can use this combination. Let me explain to you how he does it:

He places on a mica holder a sheet of gold No. 4, over this one of No. 30 and on top of these two another of No. 4. He heats these three sheets gently to red heat, then catches them on a chamois leather, presses them together with an ivory knife, and then cuts them first into strips and these finally into the usual pellets. Now you see the object in this preparation: we have a piece of No. 30 covered on both sides by No. 4 in order to allow of a perfect adherence between the different pellets. And I can assure you, this gives a most solid, brilliant surface to a gold filling, as cohesion and hardness are combined.

To save still more time in this last part of the operation, Dr. Sachs has found another possibility of working faster. He has in use four or five of the automatic machine mallets, with the most frequently used points handily in readiness on his table. He adjusts the one needed into the slip-joint handpiece of the electric engine; and commences to condense his gold. During the meantime the girl assistant places the gold pellets in the cavity, as I have described, and this will enable him to build up even large contours in a short time. The surface obtained by such a method is the hardest which can be possibly obtained in a gold filling, and forms practically a solid gold block. The fact is, if you stop to think about it, that a gold filling done strictly after these principles represents actually a solid gold inlay, held in the tooth by means of a lining of soft gold.

There is only one slight modification

which Dr. Sachs introduces in his gold fillings, and that concerns the cervical border of approximal cavities between bicuspids and molars. At these extremely difficult places to preserve from future decay, he uses one or two pellets of gold and tin. For the rest he always follows faithfully his method, which I have tried my best to explain to you.

Retaining Porcelain Inlays.

Dr. Da Silva described a new method of retaining porcelain inlays, as follows:

Gentlemen, you know the trials of cutting grooves with a diamond disk around porcelain inlays, previous to setting them. Six months ago an idea came to my mind as to how to avoid this difficulty, and I have put it into practice with success ever since.

I take the impression of the cavity, regardless of its location. The larger the cavity the larger the concavity I make in the inlay. After obtaining the cavity matrix it is invested, and a small No. 4 cylinder—either whole or one-half, or one-third, or one-fourth of it—is placed within the matrix according to the concavity I wish to produce in the inlay.

The cylinder must be placed soft, as supplied for filling purposes, and is held in place by the porcelain body itself. The outlines of the core will be reproduced in the shape of a concavity. After the baking the gold is removed from the porcelain with a small excavator. Then, to facilitate matters, instead of a diamond disk I use an ordinary paper disk to remove the glaze of the porcelain, so that the cement may adhere the more firmly.

Dr. Da Silva also reported the case of a lady fifty-five years of age who had worn a partial upper plate for many years. He said he had occasion to make for her, a year ago, a partial lower plate carrying three molars on the right side and one on the left. Since the plate was made the patient had come in to him several times in a state of great nervous excitement, stating that the flow of saliva had entirely stopped. At the time of her last visit she said not a drop of saliva was being secreted; her mouth was as dry as possible. He removed the plate and instantly the saliva began to pour from the ducts. It is quite a small plate. It rests partly on the incisors and the molars which are left. She is a very nervous woman.

Dr. I. B. Davenport. That accounts for it.

Splints in Pyorrhea.

Dr. Losada of Spain, a guest of the Club, spoke upon the making of splints for pyorrhea, as follows: My method, especially for the incisors—which are the most liable to pyorrhea—is this: I scale the teeth and maintain them in position with a silk ligature. After obtaining an impression a zinc die is made therefrom, and to it I adapt a very thin piece of platinum to cover the four incisors and part of the canines. The plate is reinforced with gold carefully fused over the entire surface. I then drill a number of holes opposite the thickest part of the teeth. The plate is then placed on the teeth in the mouth, and is held there with a fastener or pins so that it will not move, while holes are drilled in the respective teeth opposite those in the plate. Platinum pins are then slipped into the teeth through the plate, and after securing them with wax are removed and soldered. The holes are drilled not perpendicular to the teeth, but parallel to them. Having the plate ready with all the pins soldered, I polish the plate so that on the lingual surface nothing rough remains and the plate fits beautifully, holding the teeth firmly. I adjust the rubber dam and with cement mixed very clear the plate is adapted to the correct position. I secure the plate with silk thread so that great pressure may be exerted for about an hour with the rubber dam in position. The surplus cement is not scraped until the next day, with the polishing. I then renew the scaling of the roots and wash the parts with potassium permanganate or borax. It is surprising how under this treatment the gums heal. I think one of the exciting local causes of the disease is the movement of the loose teeth.

Dr. Hirschfeld. I have heard of the method of Dr. Sand in Geneva. His method is similar to that described. But where he is original is that, having once scaled the tooth he is an absolute enemy to any kind of medicament. He washes with hot water and pretends that once the cause is removed it will heal without other treatment.

Dr. Losada. Of course I believe that the first treatment should consist in the thorough scaling of the teeth, but still proper medication will assist in the treatment. Leaving the gum alone it may heal in ten days, whereas by medication it will require three or four days only. I do not know if Dr. Younger, who has studied this subject so closely, is of my way of thinking.

Dr. Younger. Holding the teeth in firm position is a very great thing and should always be done for the treatment of pyorrhea, but of course the first thing to be done is the removal of the deposit; that must be done thoroughly—not as well as you can—you must do it thoroughly, because if a particle of deposit remains you will not get perfect tissue adhesion. The scraping of the roots in itself will produce a certain denudation of the alveolus, with concomitant growth of granulations. But my idea of the use of lactic acid is, that it helps to produce the removal of the disorganized tissue that may remain, and to denude the surfaces not denuded by the instrument, and also to stop the openings of the canaliculæ —and we know there is no better germicide than lactic acid. But, moreover, I always insist upon my patients keeping the mouth thoroughly sterilized during the treatment, washing the mouth every hour or two with any sterilizing agent; otherwise the septic conditions remain in the mouth, and no wound will heal under such conditions. Asepsis must be thoroughly established. It is an error to think the gum the seat of disease; the gum is simply affected by the disease. The deposit is irritant, and if the tooth be in motion the irritation is much increased; but the gum will heal of itself when the deposit is removed; without medication it will become quite normal again. Keeping the teeth firm, once the deposit has been removed, is sufficient to allow the gums to heal; but this is aided by keeping the mouth in a thoroughly aseptic condition.

Dr. Wallison. I find that one step more in the curing of the mouth is to insist on the patient using several times a day, for ten or fifteen minutes at a time, an astringent or antiseptic mouth-wash—not strong. I think it is better to use a wash not strong for ten or fifteen minutes rather than a very strong one for two or three minutes. With all our French cooks and so forth the gums are now sadly in want of exercise, and that is the worst thing of all to weaken the teeth—the blood does not circulate sufficiently. Anything that can be done by which the circulation in the gums is augmented is the best treatment possible. How often we see nowadays a well-developed mandible while the maxilla is narrow; there is insufficiency of development of the maxilla. We should look to that, I think, and do all we can that the gums may be nourished. If people won't eat hard food as they used to do in old times, then we must have massage of the gums to make up for the lack of exercise.

Dr. Losada. We have just been told that we have pyorrhea because we don't chew hard enough. That is a catching idea, but I have noticed people in my country—poor people, who eat hard bread and vegetables only, and very little meat, have pyorrhea in teeth ground down by exercise. I have lately been at the Royal College of Surgeons, London, where I examined a number of prehistoric crania. They had pyorrhea, for there was tartar on some of their teeth, and I do not suppose French cooks existed in those days. I do not believe that that is the cause; there must be something else to account for it. Some people have pyorrhea who live very poorly; others have it who live richly.

Dr. Wallison. I was not speaking of pyorrhea specially; I was speaking of the care of the mouth—of massage of the gums. The best massage of the gums is the tooth-brush; the little bristles will excite the mucous membrane. But in

gums that are badly neglected—spongy gums—there is a lot of circulation and still they are inflamed.

Dr. YOUNGER. I saw an article in the *Medical News* in which Dr. Darby of Philadelphia was quoted as saying he had examined about 3000 natives of Egypt—living, dead, and mummies—and that in none of them had he seen pyorrhea, and very few that had decayed teeth. Now I have spent two seasons in Egypt, and, although I have not made such a thorough investigation, enough was shown me in my dragomen and boatmen and workmen for me to feel convinced that the majority of them had pyorrhea; their inflamed gums and the rugged edges of the gums indicated it plainly. When I wanted to buy some teeth I examined several natives, and in that way I saw many, and they had pyorrhea. Yet they live upon corn and wheat which they grind with their teeth. Either Dr. Darby was misquoted or the conditions that he observed in the Egyptians have changed, and this disease has since taken hold there. If I go to Egypt, as I hope to do next January, I am going to make an investigation of the mouths of all the different races there, because they don't all live alike. Some very rarely eat meat, but all more or less eat corn, sugar cane and wheat—some cooked, others without cooking at all. I am going to make a special study of that question to see what bearing the grinding of the food and the work performed by the teeth have to the production of pyorrhea. I hope to be able to report to the Club on the matter hereafter.

I. B. DAVENPORT,
Editor A. D. C. P.

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PHILADELPHIA, FEBRUARY 1905.

EDITORIAL DEPARTMENT.

DENTAL IDENTIFICATION.

WE print herewith a circular letter received from the Chief of Police of Colorado Springs, Col. The letter contains the description of the body of a woman found murdered on Cutler Mountain, near Colorado Springs. An important feature of the description is a chart showing the character and extent of the dental operations which the woman had undergone. We publish this letter and draw attention to it here for two reasons: First, because it may meet the eye of the operator and thus lead to the identification of the victim and by so doing further the ends of justice. Second, because the means taken by the police authorities in this case is a striking instance of the practicality of identification by means of the dental organs, which should be more generally used.

The records of criminal jurisprudence contain a number of striking instances of the very great utility of dental expert testimony in the identification of mutilated remains of human bodies—testimony so clear and convincing that upon it alone the murderer has been brought to justice. The well-known cases of Webster for the murder of Parkman, and of Udderzook for the murder of Goss, are classic instances of the value of expert dental evidence familiar to all. In these cases the only means at the disposal of the Commonwealth for establishing the identity of the

remains was the dental organs, and in both instances the identification by the dental expert amounted to a complete demonstration.

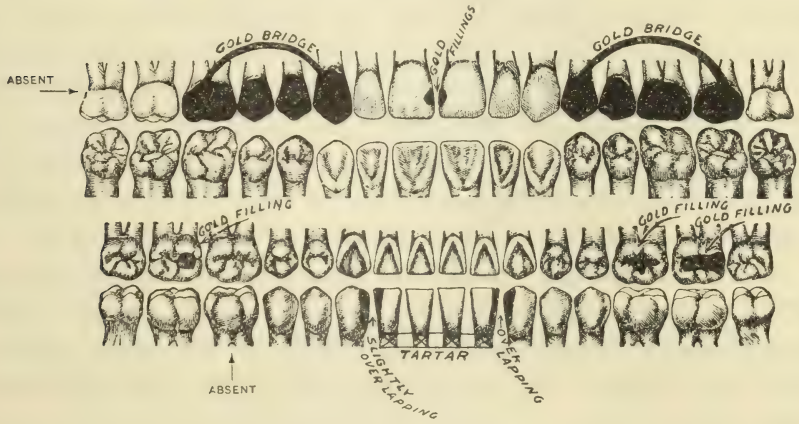
DESCRIPTION OF NUDE BODY OF MURDERED WOMAN.

Found on Cutler Mountain, December 17, 1904.

The body was that of a woman well developed and apparently well kept, but discolored from fire and exposure to the elements. The face, nose, lips, chin, left side of neck, both ears, shoulders, and breasts burned so as not to be recognizable.

She was probably between 25 and 35 years of age, weight about 120 to 130 pounds, height 5 feet 2 or 3 inches, light auburn or ash blonde hair, part of which was burned off; skin evidently fair, with no birth marks or scars showing; small bones, limbs well rounded, hips and thighs large, very small hands, nails clean, long, and well manicured; feet small, toes even and straight, nails manicured; probably wore a number 2, 2½ or 3 shoe.

Teeth.—The teeth were large, white, and chalky. In the upper jaw on the right side the wisdom tooth had never developed; the second molar was present with no fillings. A bridge extended from the first molar to the



cuspid. This bridge was of solid gold and worn on the linguo-mesial portion of the crown. The first and second bicuspid being absent, their places were supplied with solid dummies. Two gold fillings of medium size in the mesial of the upper centrals or incisors. The upper teeth protrude slightly. In the left upper jaw a gold bridge extended from the first bicuspid to the second molar; a peculiarity of this bridge is in the fact that the second molar is made of a bicuspid dummy. The third molar or wisdom tooth on this side is present. In the lower jaw on the right side the third molar or wisdom tooth is present, the second molar has a gold filling in the mesio-occlusal surface. The first molar is absent, evidently for some years, as the space is almost closed. Slight overlapping of cuspid on lateral. Pyorrhea of lower teeth—centrals and laterals—with considerable tartar, showing that they had not been cleaned recently. Left side: Considerable overlapping of cuspid on lateral; all teeth present on left side of lower jaw. First molar, large gold filling on occlusal surface; second molar, large gold filling on the occlusal extending on to the distal surface; third molar or wisdom tooth undeveloped—that is, partially covered with tissue.

All clothing, finger and ear rings, and all other means of identification

had been removed from the body and no trace of same have been found; and up to the present time we have been unable to identify her. The above description and diagram is the only evidence we have for identification.

Kindly call the attention of dentists in your city to the above description and diagram. If possible, have your newspapers print it.

Address all information and inquiries to

W. S. Reynolds, *Chief of Police.*

Colorado Springs, Colo., December 28, 1904.

Dr. Rosenbluth of Bridgeport, Conn., reported in this journal October 1902 a case of identification by the teeth in a murder trial in which he was called as an expert witness, and where the identification was complete. Numerous instances of this class are on record showing not only the very great value of the teeth as a means of identification, but still further, the importance of this class of information in its medico-legal relation.

Perhaps the most remarkable instance of identification by the teeth is that reported by Dr. Oscar Amoëdo in connection with the terrible fire of the Bazar de la Charité in Paris in May 1897, where one hundred and twenty-six persons met a tragic death, and, notwithstanding the mutilated and charred condition of the remains, all but thirty were positively identified by dental practitioners of Paris. Dr. Amoëdo has clearly pointed out the surpassing importance of the correct identification of these bodies. As quite apart from the humanitarian factors and the elements of personal grief and distress involved in any uncertainty as to identity in cases of violent death, the question of property interests of vast amount may be involved, as they were in the instance of the Charité calamity. Questions were thus promptly solved through the agency of the dental expert which determined the legality of inheritance and which otherwise could not have been solved.

It scarcely seems necessary to bring forward either evidence or argument to support the view that the teeth furnish incontestable proof of personal identity. That fact appears to be conceded not only by dental practitioners, but by the courts and by the general public as well. It must, however, be borne in mind that to be of value it must be accurate. And again, to be useful at all it must be practically available; and that naturally raises the question of records.

We are of opinion that the habit of keeping full and accurate records is not as general among dental practitioners as it should be. The average dentist when he has made a record of the operation for which he himself has received or expects to receive a fee usually feels that he has done his whole duty as to the record of his case.

A record of the dental and oral conditions of a patient is, if worthy of the name, something more than a memorandum of financial actualities

or possibilities. If complete it should contain all that is worth knowing about the mouth and teeth of the particular patient to whom it relates. In the case of that most desirable class of patients, those who have grown up from infancy in the care of the same practitioner, their dental record should present the dental life-history of the case. It is true that the keeping of full records of dental cases involves trouble and time, but these are factors common to the production of anything—in fact, all things having positive value—and are offered as excuses only by the lazy or indifferent. The unquestioned importance of such accurate records in legal cases should be sufficient reason why they should constitute part of the routine in the treatment of each case. The record may never be called for in a court, yet the importance of it when so needed is great enough in any instance to warrant the labor required to produce it in all instances.

There is, however, another important aspect of the case record system which is its sufficient justification, viz, as a basis upon which to found a rational system of practice. All who study the periodical literature of dentistry must be impressed with the mass of loose, unsupported statement regarding the results of treatment and practice, that finds its way into our journals both as formal papers and in the discussions thereon in dental society meetings. Much of this class of matter is founded upon the memory of the writer or speaker, and because of the natural inperfection of the average memory amounts to little more than guessing; it lacks order and system and above all is deficient in accuracy.

The habit of keeping full and careful records of cases begets order and system, and above all becomes, finally, the authentic basis for successful practice by the operator himself, and the means by which his results can be utilized by his colleagues.

The profession of medicine is much in advance of dentistry in the matter of case record-keeping. No intelligent physician fails to record all that is needful to know regarding the features and treatment of his cases. He has learned from the first that such records are a vital necessity to him as a professional man. In medical literature, new theoretical propositions are almost invariably supported by the testimony afforded by the records of cases. The physician has learned that the case is the only reliable text-book, and that his efficiency as a practitioner depends in large degree upon his ability to utilize the knowledge that a critical study of his cases affords. His records become an essential part of his study of cases, and he becomes educated and correspondingly efficient as a practitioner just in proportion to the thoroughness and fulness with which he keeps and studies his records. Dentistry needs more of this kind of cultivation, and the first step toward it is the record-keeping habit. And

here we commend again to our readers the Cosmos motto as a practical *motif* that will make for true success in dental practice: "Observe—Compare—Reflect—Record."

TRI-STATE RECIPROCAL RECOGNITION OF DENTAL LICENSES.

We publish in this issue, page 298, the basis of an agreement recently reached between the State Board of Registration and Examination in Dentistry for the State of New Jersey and the New York Board of Dental Examiners with reference to reciprocal recognition of licenses. We published in the Dental Cosmos for August 1903, page 670, the text of the same agreement which had already been reached between the dental examining boards of New York and Pennsylvania. This recent agreement between New York and New Jersey places the three states of New York, Pennsylvania, and New Jersey upon a basis where reciprocal recognition of licensees is possible through the medium of a uniform and maximum educational qualification. The provisions of the agreement are so rational and equitable that they should form a reliable and satisfactory precedent for reciprocity with other states able and willing to meet upon the same conditions.

Note on our August 1903 Frontispiece.

In the issue of the Dental Cosmos for August 1903 we published as a frontispiece a reproduction of an old print illustrating a dentist of the sixteenth century. At the time of publication we were without knowledge as to its authorship. We have since learned from an original print in the possession of Dr. Florestan Aguilar that the date of the engraving is 1523, and that its author is Lucas van Leyden, an early Dutch artist. We publish this information for the benefit of those who may be interested in the study of the data relating to the historical development of dentistry.

"Fusing of Platinum Solder"—A Caution.

To the Editor of the Dental Cosmos: *Sir,*—In the October 1904 issue of the Cosmos, in your "Periscope" department, at page 885, you quote from R. J. Husband, *Dominion Dental Journal,* under the above caption, this very simple method for fusing platinum solder, etc.: Simply attach your gas cylinder (N_2O) to the air nozzle of the blowpipe and go ahead! Please tell your readers *not* to attach N_2O to a *gasoline* blowpipe outfit. I tried it today, and just why I am able to write about it is a mystery, after the explosion I had!—but "bust" she did, and I don't propose to mix N_2O with gasoline any more—never!—H. H. Gantz, Albia, Ia.

BIBLIOGRAPHICAL.

CLINIQUE DES MALADIES DE LA BOUCHE ET DES DENTS.

CLINIC OF THE DISEASES OF THE MOUTH AND TEETH. By Dr. CHARLES GODON, Dean of the École Dentaire, and Dr. E. FRITEAU, Professor at the École Dentaire. Second Edition. Paris: J.-B. Baillière et Fils, 1904.

This "clinique" embodies a description of the symptomatology and treatment of practically all the diseases of the mouth and its contained organs, and of the salivary glandular system. It is divided into three parts, viz—General Considerations and Buccal Semeiology, Bucco-Dental Clinic, and Symptomatology of Dental Diseases.

In Part I, after discussing the means usually at the command of the diagnostician, the author analyzes the available methods of diagnosis applicable to the region under the immediate supervision of the dental surgeon. He mentions the oral manifestations of disorders of the digestive and respiratory systems, emphasizing the changes in the structure of the gingival and buccal mucous membranes brought about by such diseases as dyspepsia, gastritis, prolonged fevers, grippe, the exanthemata, Addison's disease, jaundice, etc.

This portion of the book, while not sufficiently comprehensive to make its understanding by the student an easy matter, is, however, one of the utmost importance, inasmuch as it clearly points out the numerous diseases which may be diagnosed, at least partially, by means of the physical signs of changes occurring within the oral cavity. The field of action of the dentist may be either limited or extensive, according as to whether the practitioner takes a narrow or a broad-minded view of the possibilities at his immediate command. We have on the one hand the conservative practitioner, inclined to question and distrust the investigations and advances of his progressive colleague and strictly adhering to obsolete methods, devoting practically all of his time and energy to the routine work of the dental office and seldom deviating from anything not strictly within the province of operative dentistry; on the other hand we have the counterbalancing factor, the practitioner of keen perception, the enthusiastic observer who most thoroughly and conscientiously studies the ailments of his patients, thereby deriving from clinical experience knowledge tending to ameliorate the health status of those entrusted to his care and to broaden the precincts of his specialty. To the latter class of practitioners this particular division of the work, as well as others to be subsequently analyzed, will be especially attractive.

Part II, devoted as above stated to a clinical study of diseases of the mouth and adjacent structures, contains an array of data upon the diseases of the lips, buccal mucous membrane, gums, cheeks, floor of the mouth, tongue, pharynx, salivary glands, jaws, maxillary sinus, temporo-maxillary articulation, as

well as upon lesions of the trifacial and facial nerves.

Part III comprises a study of the diseases of the teeth, together with an etiological description of the group of disorders of evolution and eruption which result in several forms of malocclusion and facial deformity.

Discussing the accidents occasionally accompanying the eruption of the permanent teeth, we find that while due consideration has been given by the author to those provoked by the third molar, no reference whatever is made to the phenomena which have been observed in connection with the faulty eruption of the first or second molars. Dr. James Truman, in a paper read before the National Dental Association, August 1, 1899, and published in the DENTAL COSMOS in the October issue of the same year, reviews the disorders which are likely to result through pathologic eruption particularly of the lower second molar. That this is a subject of sufficient significance to warrant its liberal discussion in a work on clinical dentistry no one will gainsay, and its omission from Dr. Godon's work must be considered a regrettable oversight.

We likewise notice that in the paragraph devoted to the discoloration of the enamel and dentin no allusion is made to the change in the appearance of the tooth brought about by the infiltration of the tubules with the products of pulp-decomposition.

Notwithstanding these omissions the book constitutes a valuable addition to the literature of the subject, as it contains a proportion of clinical data from which the practitioner and the student must necessarily derive information that will be helpful to him in the practice of his specialty.

J. E.

ORTHODONTIA AND ORTHOPEDIA OF THE FACE. By VICTOR HUGO JACKSON, M.D., D.D.S. With 760 Original Illustrations. Philadelphia and London: J. B. Lippincott Co., 1904.

As stated by the author in the preface, this new work on Orthodontia is an exposition of the system which he has formulated for the treatment of irregularities of the teeth. He had been at work upon the evolution, development, and perfection of these methods for some years previous to the Columbian Dental Congress in 1893, when his well-known communication to that body brought to the attention of the profession generally the system which bears his name. It consists essentially in the employment of spring pressure as the force for his appliances, which are fixed to the teeth used as anchorage by means of ingeniously constructed clamps called "cribs." With the exception of a few bands cemented upon teeth to be moved to afford a *point d'appui* for the spring, all the appliances are removable at will by the patient to permit thorough cleansing of the teeth. He occasionally utilizes also as a means of anchorage vulcanite plates after the manner recommended by Coffin.

The book well illustrates the careful attention to detail which is characteristic of the author. He is to be congratulated upon the painstaking method with which his records have been kept, which he says extend over a period of thirty years. The large number of completed cases shown in the book abundantly testify to the efficiency of the appliances to carry out, in his hands, his purposes. Only the apparatus he has employed in practice is illustrated, and it displays a great degree of ingenuity. The various uses to which the "cranial-cap" anchorage is put, the device to break up the

habit of thumb-sucking, and the "crib" anchorage are notable examples.

It is believed that the very nature of this contribution to orthodontic literature, valuable as it is, will preclude its general adoption as a class-book. It represents the views of the author on questions upon which orthodontists are not by any means agreed. It deals more with the detail of apparatus construction than it does with the fundamental principles of orthodontia. The number of appliances proposed does not tend toward a simplification of the means at our disposal for attaining a desired end—the end being the most important thing to be borne in mind. In the chapter on Rotation of the Incisors, as an example, there are so many ingeniously contrived appliances that one is perplexed as to a choice.

The chapter on Etiology devotes considerable space to a consideration of mouth-breathing, and a new explanation of the mechanism producing the characteristic dental deformity which results from it is suggested. It is to be regretted that so little attention is paid to the influence of occlusion among the factors operating after birth. It is difficult to understand how the author should fail to include the perversion of this force in his causes, unless it be because his conception of the ends of orthodontia is the establishment of a regular alignment rather than a denture each tooth of which shall occlude in the normal way. This view is borne out by the small amount of space devoted to occlusion and to a consideration of the mesio-distal relation of the jaws. The chapter dealing with "jumping the bite" treats of this operation as one to be desired in some cases to improve the profile and occlusion, but this latter object is not prominently brought out elsewhere.

In the portion of the book on Facial Orthopedia the author quotes largely from the published work of Dr. H. O. Roe. It is to be regretted that the illustrations are not of the same grade as are elsewhere found throughout the work.

The book will be valuable to those who have been unable to profit by the personal instruction of the author and who desire information upon his methods. It is believed that its general use will be limited to those who agree with his well-known views. C. R. T.

BOOKS AND PAMPHLETS RECEIVED.

Estudios sobre Anestésicos Locales en Odontología. "Studies of Local Anesthetics in Dentistry." By Tirso Pérez, Surgeon-Dentist of the Faculty of Medicine of Madrid. *La Odontología*, Madrid, 1904.

Handbuch der Zahnersatzkunde. "Handbook of Prosthetic Dentistry." By Julius Parreidt. Third Edition, with 291 illustrations. Arthur Felix, Leipzig, 1903.

Atlas-Manuel des Maladies des Dents et de la Bouche. "Atlas-Manual of the Diseases of the Teeth and the Mouth." By Gustave Preiswerk, of the University of Basle. Translated into French by Dr. Joseph Chompret, Dentist of the Hospitals of Paris. J.-B. Baillière et Fils, Paris, 1904.

REVIEW OF CURRENT DENTAL LITERATURE.

Conducted by JULIO ENDELMAN, D.D.S.

[*Journal of the American Medical Association*, Chicago, December 24, 1904.]

TREATMENT OF LUPUS BY THE NON-SPECIALIST. By Dr. Dreuw.

Dreuw (*Berliner klin. Wochenschrift*, No. 47) recommends the freezing of the lupus patch with ethyl chlorid and then rubbing into it crude hydrochloric acid saturated with free chlorin. He has applied this treatment to twenty-five patients, and the results, he thinks, justify the statement that any practitioner can now successfully treat lupus. He rubs the acid into the patch with a cotton-wound toothpick. It immediately induces such an immigration of leucocytes that it is almost impossible to detect the tuberculous or lupous character of the tissue afterward. This immigration is much more excessive than has been observed hitherto under any circumstances. Even long-established cases of lupus yield to this treatment, and in three patients treated more than a year ago there has been no tendency to recurrence. The treatment is equally effectual for tuberculous abscesses and fistulas, being applied under narcosis.

[*Medical News*, New York, Dec. 10, 1904.]

THE INFLUENCE OF THE FIRST AND SECOND DENTITION PERIODS IN THE ETIOLOGY OF EPILEPSY. By William P. Spratling, Medical Sup't Craig Colony for Epileptics, Sonyea, N. Y.

The author states that practitioners are never justified in looking upon the convulsions of infancy and early life as harmless manifestations. Numerous cases of convulsions which begin at these periods end in established epilepsy. A study of the etiology of epilepsy in nearly two thousand cases has led him to assert that in a considerable number the condition is the immediate or remote consequence of pathological dentition. His observations of 1215 inmates show that the disease occurred between the first and twentieth years. The greater number of cases occurred at one year of age, when they gradually decreased up to the fifth year. With the beginning of the eruption period of the second dentition the number began to increase, and was kept on the ascendant until after the eruption of the second molar. In a second study of the 175 cases previously mentioned which developed at one year of age, it was found that at the sixth month more cases originated than at any other time in that period of twelve months. The fact of importance about the rise between the sixth and seventh months is that at this period the incisors usually begin to erupt.

The statistics which the author has collected point out the fact that the greater number of cases develop concomitantly with the eruption periods of the deciduous or permanent dentitions. He quotes several specific cases, and in conclusion summarizes his views as follows:

1. Difficult dentition, *i.e.* the piercing of the gums by the tooth, may in suitable subjects constitute a sufficient irritant to cause convulsions.

2. In suitable subjects these convulsions may ultimately lead to epilepsy.

3. By suitable subjects I mean infants who inherited a neuropathic tendency to disease; whose parents had epilepsy, or insanity, or who were alcoholic, or suffered from some other general vice that could be transmitted to the offspring in some form capable of decreasing its powers of resistance to disease.

4. I do not believe that difficult dentition alone, in a child who inherited no ancestral taints and who at its birth is free from a tendency to neuroses, can cause epilepsy.

5. Great caution must always be exercised to lay the true cause in cases of this kind where it belongs; for the reason that gastro-intestinal disorders, the sequelæ of the eruptive fevers and other factors common at this age, may produce similar results.

The author in conclusion attributes the resulting nerve irritation to the piercing of the gums by the erupting tooth, a *reductio ad absurdum*, inasmuch as it is not brought about to any appreciable extent by pressure against the overlying gingival membrane, but

by *contre-coup* against the highly sensitive formative organ—the pulp. At the time of eruption the roots of the teeth are incompletely calcified, the pulps being exposed at the root-ends. The resistance offered to the erupting organ by the often tenacious and dense gingival covering being frequently greater than the force of eruption, the tooth for a time remains practically at a standstill. The calcification of the root is in the meantime progressing in the opposite direction, and meeting with as great a resistance against the surrounding bony tissue. Consequently the developing tooth becomes the opposing body to two forces, one from above and the other from below, or *vice versa*, according as to whether the tooth be an upper or a lower. The resultant of these forces produces severe irritation and pain because of the undue degree of pressure, not against the fully calcified crown portion of the tooth or the gum, which is able to withstand a relatively intense degree of pressure without any great inconvenience, but against the highly vascular and sensitive pulp.

[*Association Odontologique de Bordeaux.*]

CARDIAC SYNCOPE IN THE COURSE OF SOMNOFORM ANESTHESIA. By Dr. J. Dufour.

The writer begins his communication by remarking that the use of anesthetic mixtures containing ethyl and methyl chlorids and ethyl bromid is not wholly devoid of danger, and reports the case of a woman aged forty-eight, of weak constitution and with a past history of puerperal endometritis and neuralgic attacks of dental origin, who suffered from a severe cardiac syncope while under the influence of somnoform. While, as above stated, the patient was in a physical condition below par, yet a careful examination brought out no organic lesion—a negative result, as in the case of several previous examinations by other practitioners. The author emphasizes this point in order to show that the syncope which developed in the course of the anesthesia could not be accounted for in any way by the presence of any latent or active cardiac or pulmonary lesion.

The patient was at two different times placed under the influence of somnoform for the extraction of a large number of teeth. The first intervention was carried out without the slightest difficulty or discomfort. At the second intervention, sleep ensued shortly after the beginning of the inhalation and was accompanied by general contractions and opisthotonos. The extractions were performed in less than forty seconds, and were soon followed by a serious syncope, from which the patient recovered only after long and active stimulation of the respiratory and cardiac functions.

This case is reported mainly for the purpose of pointing out the fact that even the so-called innocuous anesthetics are not entirely devoid of danger. The same precautions as with chloroform and ether should be observed with the less dangerous anesthetics.

[*Bull. de Thérapeutique*, Paris, October 1904.]

FŒTOR EX-ORIS.

The following gargle is recommended:

℞—Cherry-laurel water, ℥vij;
Tincture of benzoin, ℥iij;
Tincture of patchouli, ℥ij;
Labarraque solution, ℥j. M.

Sig.—To be used thrice daily in the proportion of ℥j to water ℥vj.

[*Thesis at the Faculty of Medicine of Lyons*, July 1904.]

ON THE USE OF ETHYL CHLORID IN DENTAL SURGERY. By Dr. Louis Dalban.

From the viewpoint of its local action, the author prefers ethyl chlorid to cocain in operations within the sphere of dental surgery, because of its absolute innocuousness, facility of employment, and because its use is very rarely contra-indicated.

Discussing the agent from the standpoint of general anesthesia, the author refers to the various modes of administration, and to its superiority to all other anesthetics for operations of short duration. He records a series of forty-five operations within the mouth successfully performed under the influence of ethyl chlorid, used in some cases as a local and in others as a general anesthetic.

[*L'Odontologie*, Paris, December 15, 1904.]

LEUCOPLAKIA BUCCALIS: A WELL-DEFINED CASE OF BUCCAL PSORIASIS. By Dr. Gau, Nîmes, France.

The patient, a man aged thirty-five, presented himself for treatment at the clinic of the École Dentaire of Lyons. Throughout the mucous membrane were scattered the whitish plaques indicative of leucoplakia. The history of the patient eliminated entirely the possibility of an early syphilitic infection as the cause of the disturbance. The psoriatic appearance of the white plaques led to a closer questioning regarding any past or present skin eruption. It was then that the

diagnosis of buccal psoriasis was confirmed, as the patient's upper and lower extremities were the seat of a well-defined psoriatic eruption. The onset of the disease dates back to 1885. At first localized upon the elbows, knees, thorax, with slight traces upon the back, limbs, and scalp, it gradually became more intense until it involved practically the entire external surface of the body. In 1892 the disease had spread to the angles of the mouth, the labial and buccal mucous membranes, and the soft palate. In 1896 he suffered from arthropathic attacks which characterize the psoriatic syndrome. These manifestations were localized at times upon the knees and ankles, and at others assumed the nature of erratic arthralgia.

Ever since that time the arthritic manifestation has reappeared at irequent intervals concomitant with psoriatic eruptions upon the epidermis. The administration of sodium salicylate during two years, together with a season spent at the hot springs of Beaumeles-Valence, were of no avail in reducing the intensity of the rheumatic attacks. At the present time the patient presents a nummulated psoriasis over the entire epidermis, being particularly well developed upon the lower extremities, where a slight dermatitis is present. Upon the arms, back, and especially upon the elbows, the patches are typical. The scalp is the seat of cretaceous plaques. Upon the tongue are to be seen three pearly papules of brilliant appearance and well-defined borders. A digital examination showed them to be dry, and revealed the existence of a sclerotic induration under the pearly covering. Upon the posterior third of the velum palati, also upon the uvula, are to be found irregular patches forming a mosaic-like covering of white and red squares. The cheeks are likewise the seat of whitish plaques, which extend at the level of the occlusal line from the third molars to the angles of the mouth. The patches were neither painful nor pruritic, and all other subjective symptoms were *nil.* Scraping of the patches and manipulative treatment were borne without the slightest inconvenience.

The author appropriately remarks that leucoplakia buccalis is a term of insufficient meaning. It designates the lesion without in the slightest way revealing the nature of the disease. It is an anatomo-pathologic term with neither pathologic nor etiologic significance.

The presence upon the oral mucous membrane of white plaques of divers forms may be the manifestation of either one of the following buccal disorders: flat lichen, buccolingual eczema, cachectic glossitis, with that of convalescents, indurated chancre, secondary syphilids, tertiary sclerotic glossitis, secondary syphilitic leucokeratosis, nicotinic leucokeratosis, the leucokeratosis of glassblowers, traumatic leucokeratosis, idiopathic leucokeratosis. The case above described was doubtless a typical buccal psoriasis. The nature of the eruption, the progressive evolution of the lesions, and the arthralgic attacks confirmed the diagnosis. In 1898 Shütz reported three cases of leucoplakia buccalis in psoriatic patients, and the following year Lissauer found ten cases of leucoplakia in a series of fifty psoriatic patients.

[*Medicine*, Philadelphia, September 1904.]

THE MOLAR TEETH AND THE PATELLAR REFLEX IN HEREDITARY SYPHILITIC INTERSTITIAL KERATITIS. By George F. Suker, Chicago, Ill.

After quoting several of Hutchinson's commentaries on the diagnosis of hereditary syphilis, the author states that heretofore it has been the custom, particularly in ophthalmic practice, to associate the peculiar defective incisor and bicuspid with inherited syphilis. The other teeth receive little atention, although the first permanent molars give as distinct evidence of the inherited taint as any of the other teeth. Fournier was the first to point out the characteristic appearance of the occlusal surface of the first molars, with the peg-shaped cusps devoid of enamel, in subjects with hereditary syphilis.

In this connection the reviewer ventures to call attention to the fact that Jonathan Hutchinson described the peculiar deformity of the permanent upper lateral incisors only, the term "Hutchinsonian tooth" having therefore reference to these particular teeth and not to any other. In 1863 Hutchinson stated that the whole question involved the examination of the permanent upper lateral incisors and that many physicians who are not acquainted with tooth-deformities could spare themselves many inconveniences by limiting their examination to these teeth.

It is easily explainable why the first molars and lateral incisors should be the organs to show the most marked malformation when we recall that the influence of hereditary syphilis is most active between the first and second years of life, at the time when calcification of the incisal edge of the incisors and the occlusal surface of the first molars takes place.

As previously enunciated by Hutchinson, the manifestations of inherited syphilis de-

pend largely upon the following two conditions: First, upon the severity or intensity of the infection. This includes the severity of the poison in one or both of the parents, as well as the stage of the syphilis at the time of conception (in either one or the other parent). Second, upon the time of the development of the particular organ, especially the period of the development of physiological maturity of that organ.

The author next takes up the relationship of patellar reflex disturbance, stating that his observations agree with those of Harman, who found, contrary to the investigations of Wood and Lang, in 100 cases no material difference in the reflex act as it occurs in normal individuals.

[*La Revue de Stomatologie*, Paris, December 1904.]

POTENTIAL TREATMENT OF THE MANIFESTATIONS OF FAULTY ERUPTION OF THE THIRD MOLAR AND OF APHTHÆ. By Pierre Robin.

The author reported in 1902 the result of pyorrheal treatment with Nordhausen sulfuric acid. The same method he has followed in the treatment of accidents caused by the pathologic eruption of the third molar, such as pain, trismus, etc., likewise in the treatment of aphthæ. The application of this potent cautery upon aphthous patches has caused their disappearance in a short time. The author reports a case of aphthous fever in which the treatment here advocated brought about a cure within a week. In the treatment of gingival and buccal inflammation due to the pathologic eruption of the third molar the careful application of the acid decreases the pain and reduces the inflammation. This method is claimed to be less painful and easier to carry out than the customary one, which consists in deep lancing of the overlying gum flap.

The precautions to be observed whenever caustic agents are made use of within the mouth must be rigorously adhered to when applying Nordhausen sulfuric acid. It is a violent caustic and its action should be limited to a definite area.

[*Journal of the American Medical Association*, December 24, 1904.]

SPINAL ANALGESIA. By Dr. Silbermark.

The author (*Wiener klinische Wochenschrift*) describes his experience in 232 cases at Mosetig's clinic, Vienna. It was found efficient for operations in the genito-urinary system and in the lower extremities, and can be used without hesitation in all subjects over sixteen.

Dr. Silbermark considers spinal anesthesia a valuable substitute for general narcosis for debilitated and elderly subjects. From 1 to 2 cc. of a 3 per cent. solution of beta eucain in distilled water were injected into the dural sac after from 3 to 5 cc. of the cerebro-spinal fluid had been allowed to escape. The anesthesia lasted from twenty-five minutes to an hour and forty minutes. It was so complete in 170 cases that there was no sensation except that of pressure during the incisions and traction on the soft parts and nerves. No after-effects were observed in 79.5 per cent. of the subjects. When the operation was undertaken in silence, without asking the subject if he felt nauseated, etc., it proceeded without disturbances, or if any occurred, they were slight and transient. The toxic symptoms indicated bulbar irritation and in five cases there was dyspnea, dilatation of the pupils, cold sweat, and small pulse, with tremor of the muscles in two. A few drops of chloroform soon dispelled these phenomena. They occurred exclusively in persons under sixteen or in hard drinkers. The recovery was so rapid that the operation did not have to be interrupted.

[*L'Odontologie*, Paris, December 30, 1904.]

ERYTHROPHLEIN CHLORID IN THE TREATMENT OF SENSITIVE DENTIN. By M. Audy, Paris.

After referring to the number of agents and devices advocated in the treatment of sensitive dentin, the author mentions the articles by Dalma and Rubrecht on the use of erythrophlein for the purpose embodied in the title of the communication under discussion.

Erythrophlein is an alkaloid extracted from the bark of the African tree, the *Erythrophlœum Guineënse*. It is an extremely toxic substance with selective influence upon the heart. Injected under the skin of a frog's leg in 2 milligram doses it brings about inside of five to eight minutes the complete arrest of the cardiac contractions. The ventricles are the first to stop, the arrest occurring during systole; the auricles soon follow, their cessation of function taking place in diastole. The paralysis of the cardiac muscle is followed shortly after by progressive resolution, death occurring at this time. In the warm-blooded animals, the alkaloid produces convulsions and dyspnea consecutive to the blood changes it induces. Post-mortem examination shows the heart soft and filled with

blood, and traces of the alkaloid in the bloodvessels. Atropin does not stimulate a heart paralyzed by erythrophlein. Curare retards the effects of the alkaloid.

The author reports in detail cases in which dentinal hypersensitivity of the acutest type was successfully obtunded with minute applications of a solution of the alkaloid in eugenol. His observations also show that the alkaloid possesses, apart from the property above alluded to, an inhibitory action upon the carious process. The application of the erythrophlein solution has apparently no effect upon the parenchyma of the pulp, the effect being localized to the area with which it comes into direct contact. The entire dentin region is not rendered insensible by the mere introduction into the cavity of a dressing of erythrophlein, although this limited action should be considered an advantage, for while the whole depth of dentin is not anesthetized, yet a sufficient extent of tissue is affected to permit of the painless excavation of the cavity. In the case of a first molar with a cavity in the occlusal surface and one upon the approximal side an application of the solution in question was made in the approximal cavity only, the patient having been dismissed with an application of an almost inert substance in the occlusal cavity. A few days afterward the patient returned and while the excavation of the approximal cavity was carried on painlessly that of the occlusal cavity gave rise to violent pain.

The technique of application consists in the removal of as much of the disorganized tissue as possible and in a thorough dehydration of the cavity. A very small pellet of cotton saturated with a 50 per cent. solution of erythrophlein in eugenol is then introduced into the cavity and sealed in with a temporary gutta-percha filling. In the case of very shallow cavities instead of cotton a piece of Japanese bibulous paper is saturated and placed against the floor of the cavity. The dressing is allowed to remain undisturbed for from twenty-four to forty-eight hours, when the tissues will be found sufficiently obtunded to proceed with the excavation painlessly. It is absolutely necessary to remove the dressing inside of two days, as erythrophlein when left in a cavity for more than the stipulated time is likely to provoke slight inflammatory symptoms in the pulp and pericementum.

In young subjects erythrophlein is not as likely to induce pulp or pericemental inflammation when allowed to remain in a cavity for over two days as in old subjects. In explanation of this difference in action in individuals of extreme ages, the author offers a theory which *si non é vero é ben trovato.* Erythrophlein as already stated is a powerful vaso-constrictor, but its constricting action affects not only the bloodvessels but protoplasm in general. In young patients the dentinal tubuli are of a larger caliber than in old ones, so that when the contracted fibrillæ begin to regain their normal condition they will do it without rubbing against the walls of the tubuli. In the older subjects the tubuli have decreased in diameter owing to continued calcification and the return of the contracted tubuli to their original condition of tone is, of course, accompanied by friction against the walls of the tubuli, the irritation with consequent pain spreading to the pulp and therefrom to the pericementum.

In conclusion the author summarizes his observations as follows:

First: Erythrophlein is the agent *par excellence* for the treatment of sensitive dentin.

Second: Erythrophlein has no caustic action, its effect being merely one of intense vaso-constriction.

Third: The insertion of the gutta-percha sealing is followed by no discomfort whatever.

Fourth: The symptoms of pericementitis which may occasionally develop are very slight and have no permanent influence upon the life of the tooth.

Fifth: Its absolute innocuousness in young patients make it especially applicable to the devitalization of the pulps of the deciduous teeth.

Sixth: A dressing of erythrophlein permits of painlessly excavating hypersensitive cavities of the third degree and of the subsequent devitalization of the pulp with arsenic with no consequent pain.

PERISCOPE.

The Shape of Rubber Dam.—In cutting rubber dam for the anterior teeth, a saving may be made by cutting it three-cornered instead of four-cornered. Take a square piece, and cut it diagonally from one corner to another, which makes two pieces of convenient form for an operation on the front of the mouth.—E. D., *Dental Review.*

Fillings with Alternate Layers of Cohesive and Non-Cohesive Gold.—Cohesive and non-cohesive gold I use in combination to advantage by placing a layer of the non-cohesive gold on the cavity margins and covering it with a layer of cohesive foil. By placing it in alternate layers, a hard filling is made, and at the same time one the adaptation of which to the cavity walls is more perfect.—J. F. Stephan, *Dental Summary.*

Use of a Solution of Sodium Chlorid after the Application of Silver Nitrate to the Mucous Membranes.—Walter Griess (*Therapeutic Gazette*, September 15, 1904) advocates the use of a solution of sodium chlorid after the application of silver nitrate to any of the mucous membranes. By so doing he does away with the great discomfort to the patient resulting from the use of this drug in the usual manner.—W. E. M., *Lancet-Clinic.*

Menthol Crystals.—Sometimes in operating for pyorrhea the tissues are sensitive. It may not be advisable in a given case to employ cocain, on account of contra-indications. In such cases pack the pyorrhea pockets with menthol crystals a few minutes in advance of the operation. It will be found a great relief to the patient, and is in every way a more pleasant application than cocain.—E. D., *Dental Review.*

Iodin Treatment of Suppuration.—The tincture of iodin applied locally is one of the most efficient drugs for the treatment of suppuration. The author asserts that after one or two applications of iodin to an infected and discharging wound, the pus will almost entirely disappear and the wound will be practically dry. In surgical tuberculosis favorable results are to be anticipated.—W. S. Pugh, Jr., *Amer. Medicine.*

Sterile-Water Anesthesia.—S. G. Gant (*Medical Record*) describes in detail his method of obtaining local anesthesia by the hypodermic injection of sterile water. The method is simplicity itself. The only thing necessary is to inject enough sterile water to blanch the tissue in the area of operation. The more or less care used in injecting the water will make the difference between failure and success. The cases in which the author has employed it include a number of radical operations. The objections to the method are practically *nil.*—*Monthly Cyclopedia of Pract. Medicine.*

Vulcanization upon Metallic Bases of Alloys of Silver and Copper.—During the process of vulcanization of rubber upon metallic bases other than silver and copper, but alloyed with these two metals in certain proportions, the liberated hydrogen sulfid in its nascent state acts upon this silver and copper alloy, forming respectively silver and copper sulfids. This chemical removal of the alloy from the metal base will leave the surface of the base in a more or less pitted condition, and this fresh rough surface offers a suitable place for the ready adhesion of the vulcanite to the metal.—Walter M. Bartlett, *Dental Register.*

Prosthetic Appliances and the Dental Laboratory.—It is surprising what meager and old worn-out appliances some good dentists are content to work with. I recently visited an office which reminded one of a junk-shop more than a dental laboratory. It contained almost everything from a worn-out bird-cage to a static electric machine, except that the dental appliances were few and badly worn out. The old foot lathe was so badly worn that it rattled badly. A battered vulcanizer and a few worn-out files and scrapers were practically all the tools visible. There was dust and dirt everywhere. It was a poor place for sociability and its occupant was not notorious as a sociable person. It is not necessary that our laboratories should be filled with all manner of devices, however useful they may be on occasions, but enough well-selected and up-to-date appliances necessary to do modern work should be found in every well-regulated laboratory.—N. S. Hoff, *Dental Register.*

The Electric Switchboard in the Dental Office.—No office is complete without an electric switchboard to which may be connected the engine, furnace, lathe, annealer, hot-air syringe, cautery, mouth-lamp, and such other electrical appliances as may be needed to meet the individual wants. This switchboard would be better covered or inclosed in a cabinet admitting the light from the side toward the window, and provided with a door on the opposite side through which we may conveniently operate the switches and yet conceal the entire appliance from the constant view of the patient. In fact, it should be the constant study of the operator to have as little machinery in evidence as possible.—E. A. Honey, *Dental Register.*

To Remove a Cemented Crown-Post from a Root.—With a tiny pointed drill made from an old round bur No. ½, drill along one side of the post to as near the end of it as possible, selecting the side with the greatest amount of dentin between the post and the periphery of the root, usually the labial or lingual aspect, to avoid any danger of perforation. Now with a spiral broach inserted into the drill-hole, literally saw the cement from around the post, thus releasing it. The best form of broach is the one with a little ball of metal for a handle. They are stiff, and the ball being close to the spiral, lateral pressure is more effective than in those with the longer butt. It is surprising with what facility a cemented post can be removed in this manner.—H. B. Tileston, Louisville, Ky., *Dental Summary.*

Bandless Crowns.—Don't use bands! Now, I do not ask you to take my word for this, but I ask you to watch your bands; that is all. There is more devilment done, more mischief, by the setting or undertaking to set porcelain crowns with bands than any other one thing in dentistry—did you know that? Therefore use as few bands as possible. Why? Because a band does not do any good; it does not strengthen the crown; and if it did, I do not want it anyway, because I obtain all the strength I want without the band. A band is put on for the purpose of hiding a joint. You make a bad joint and put on a band to hide it. All I ask you to do is to watch and make notes of what you see in the way of setting of band crowns. I do not mean by this that we must not use gold crowns in the back of the mouth. Use them if you want to, and fit them as accurately as possible. You never did get one fitted accurately, and you never will.—D. J. M'Millan, *Dental Summary.*

Method of Making Drills.—Old and worn-out engine burs, without drawing the temper, may be speedily converted into drills by the use of the engine and laboratory lathe; the engine holding the bur being rotated in one direction and the laboratory lathe, with a mounted carborundum wheel of two to three inches in diameter, rotated in the opposite direction, the bur and shank to be applied laterally to the wheel—a principle or method often used in mechanics when true cylindrical work is required. Small excavators, hoes and chisels, by the same method may be reduced to smaller sizes before drawing the temper, with a distribution of metal where most required for strength without clumsiness, and an artistic delicacy to the shank and blade that requires time and skill with files.—B. Bannister, *Dental Summary.*

An Ideal Dental Laboratory.—The location of the laboratory should be among the first things decided upon in arranging the office. The proper place for this room is to the right of the operating room, and it should be at least twelve by fifteen feet in size. A room of this size may seem to some to be far too large for convenience, but when it is remembered that one has to spend hours in this room, we can readily see that it is, if anything, too small for good hygienic conditions. The work to be done at the different benches will require different sets of tools and appliances, and can be spread around a good-sized room and still be very convenient. This room should be well supplied with light which comes in through at least two large windows at the front. I wish especially to call your attention to this point, as I have seen so many laboratories tucked away in a little dark hole, where it is simply impossible for any man to do that fine work which is required of us.—Chas. H. Worboys, *Dental Register.*

Accurate Plaster Casts in the Study of Dental Irregularities.—The first essential for the consideration of any case of irregularity is to procure as perfect a cast from plaster impressions as possible. More than any other detail in orthodontia does an accurate model mark the dividing line between the artist and the amateur. Having procured such a cast, and also a somewhat general history of the case, including such data as the full name and age of the patient, we are prepared for a more or less detailed study of its etiology. Among the many factors now known to be operative in the causation of the various types of irregularity there can

be none of greater interest to the dental practitioner than those grouped as "local causes." A study of this group very forcibly emphasizes the necessity of avoiding the early loss of deciduous teeth, as evidenced by the disastrous results which generally follow, and their mischievous influence upon erupting permanent teeth, should they persist long after the need which occasioned them has ceased.—Benno E. Lischer, *Dental Era.*

Investment Material.—About five years ago I was convinced that crowns and bridges could not be properly constructed without using one of the various investment compounds that we see advertised, but I have readopted the old-style sand-and-plaster investment with very pleasing results. Some time ago I procured a peck of sand such as the cement-walk builders use, and when I have occasion to invest a case I employ the following method: First add a little potassium sulfate to the water in the plaster bowl and sift in the amount of plaster necessary for the case. After the plaster is absorbed pour off the surplus water, and stir in sand until the mixture looks like the mortar that is used for plastering houses. Place this upon a glass slab and invest the case. It is better to trim off the surplus while the investment is soft, for when it becomes hard it is difficult to do so. This investment will be ready for the fire in three minutes or less, and I do not know of any material that will stand as much heat and be as hard after heating. It is simple and cheap, and I hope that others may take the pleasure in its use that I have had. —E. H. Allen, *Dental Review.*

Solid Food Diet for Children.—It may be said the pap-feeding of children is the outcome of years of practical experience, and that it might be a fatal or dangerous experiment to venture upon a new method of feeding. All possible theories may be advanced against feeding children with food which demands much mastication, but the system has already been put to the test over and over again. In many cases it has been carried out more or less by chance, or by force of circumstances, but recently it has been put into deliberate practice in several parts of the kingdom, and from all I hear, with the most excellent results. I know of one child, who after he was weaned was seldom given any food which did not require a very considerable amount of mastication, and before he was three years old he sat down to his Christmas dinner, and had a liberal supply of turkey, boiled ham, greens, and potatoes, two helpings of plum pudding, some nuts, and an apple. He was not in the slightest way upset, and was happy to go through the same meal on the following day, except that the turkey was cold. Needless to say, his teeth do not show the slightest signs of decay, although nowadays, at the age he now is, it is quite usual to find decay more or less advanced, in several teeth.—J. Sim Wallace, *Brit. Dental Journal.*

Peculiar Effect of the Radium Rays.—Experiments have been made by Schwarz (*Blätter fur klinische Hydrotherapie*) upon the effects of radium on hens' eggs. A capsule containing 2 cgm. of radium bromid was fastened to the egg by strips of court-plaster, and retained in place for 144 hours. The changes noted after its removal were a slight browning of the white shell, a coagulation of the white with the formation of a thin pellicle, and a greenish gray discoloration of the yolk in an area 4 mm. in diameter. The portion of yolk opposite this area was easily separated from the rest of the yolk, and had the taste of trimethylamin. Schwarz attributes the browning of the shell to a change of color of the organic substances from a sort of dry distillation, and the change of color of the yolk to decomposition of the lutein. The further change in the yolk was attributed to the decomposition of lecithin, for he was able to prove that the influence of radium rays on lecithin produces a marked taste of trimethylamin. It is certain that there is no putrefaction, because radium rays are destructive to putrefactive bacteria. As lecithin is found abundantly in growths, such as lupus and carcinoma, therefore the favorable influence of radium rays in these conditions may be traced to the destruction of lecithin. —*Modern Medicine.*

Music as a Therapeutic Agent.—F. S. Kennedy (*Medical Record*) states that in many instances much assistance is to be derived from the intelligent use of music, either vocal or instrumental, as a therapeutic adjunct. Melancholia, insomnia, hysteria, family affliction, business reverses, delirium, pain, fatigue—mental or physical—will all be helped by the beneficial influence of music, rightly used. As a post-operative measure it would have an undoubted influence for good in taking the patient's mind from his bodily distress. So also could "painless" dentistry be relieved of some of its pain and distress by the quieting influence of music, which would, as has been amply demonstrated, produce a pleasanter mental influence during the

administration of nitrous oxid or other anesthetic. A German writer recently stated that in a number of test cases in which music was provided during the administration of the anesthetic, there was an absence of distress and resistance on the part of the patient, and also an absence or reduction of the post-operative nausea under the same circumstances. To be advantageous, the nature of the composition must be carefully selected with a view to the needs of the individual case, and the execution must be as nearly faultless as possible.—*Monthly Cyclopedia of Practical Medicine.*

Symptoms of Ulcerative Stomatitis.—One occasionally sees patients in whom the septic condition of the mouth seems to have reached a stage in which the great power of resistance of the tissues is completely overcome. The teeth are covered with decomposing organic material, and wherever the mucous membrane comes in contact with them, deep red patches of inflammation appear or ulcers of considerable size. These are the cases that call for active antiseptic treatment, and they are attended with a certain amount of danger. The milder types of stomatitis are more usually seen in children. That known as ulcerative stomatitis has very definite characteristics. The parts usually affected are the margins of the gums beside the necks of the teeth; and in the situation where the inflammation is most severe, small ulcers are usually seen, generally covered with a grayish or yellowish slough. The disease is locally infective, and spreads rapidly round from one side of the jaw to the other, also affecting those parts of the mucous membrane of the cheek which are in contact with the parts of the gums involved. The teeth gradually loosen, and necrose if the condition is not treated. I have noticed that the original site of the disease is frequently in the immediate neighborhood of a loose, dead, septic, deciduous tooth. Removal of the offending tooth, and of others which are very loose, vigorous local antiseptic treatment, with the use of potassium chlorate locally and internally in the form of lozenges, rapidly effect a cure.—Norman G. Bennett, *Brit. Dental Journal.*

A Method of Crowning a Broken-down Bicuspid or Molar.—Many times we are consulted about broken-down roots which the patient desires, if possible, restored to usefulness. In such cases a good method of procedure is as follows: Clean out the root-canal, or canals, and when in an aseptic condition insert permanent root-fillings. The next step is to select a suitable screw-post, preferably one made of platinum; then take a bur or drill, a size or two smaller than the size of the post, and drill up into the canal if a one-rooted tooth, or into the largest canal if a multi-rooted tooth, to make anchorage for the screw-post. This opening should be of sufficient depth so that when the screw-post is turned up tight it will be firmly anchored. The post being solidly in place, a measure of the circumference of the remaining portion of the root should be taken, and a band of German silver made to fit the root. The thickness of this band should be about No. 30 or 32-gage. Place this band over the end of the root, having the screw-post in the middle. Now fill up the band around the post with amalgam, being careful to pack it in tightly. The patient may now be dismissed, and at the next sitting the German silver band should be removed. If the post is too long it should be ground down until it is even with the amalgam.

Upon the built-up root a shell crown can now be adapted without the least fear of its ever breaking off. Roots that were broken down so that no portion was within an eighth of an inch of the surface of the gum have been restored to usefulness by this method, with the most serviceable results.—C. C. Mottinger, *Dental Summary.*

The Possibilities of Amalgamated Gold.—In my judgment it has completely solved the problem of setting Logan crowns, as it makes a perfect joint, and does away with the liability of checking or changing the shade of crown, as is the case when the V-shaped space is filled either with gold, silver, or porcelain.

After preparing the root, grind the crown so as to leave a V-shaped space between the prepared root and crown. Place a small amount of softened base-plate gutta-percha around the pin; take a piece of gold plate, large enough to cover the end of the root, No. 36 gage, 24-k.; punch a hole large enough for the crown pin, and place gold plate on pin over gutta-percha. Then put the crown in place on the root, using pressure sufficient to adapt the gold to the root. Remove crown, trim the plate to the circumference of the root, and the gutta-percha to the circumference of both crown and root. Place a thin film of beeswax on the crown pin, embed the crown in a small quantity of plaster of Paris at an angle of 45°, pin down, gold matrix and gutta-percha being in place. After plaster is set, remove the crown and gutta-percha from

the plaster. The beeswax around the pin has facilitated this removal, leaving the gold matrix in plaster. Replace the crown in plaster and fill the V-shaped space with amalgamated 24-k. gold, packing it well, as you would in amalgam fillings. Surplus mercury can be absorbed with tin foil; the dryer the amalgam is worked the less shrinkage. Place a half-pint of molder's sand over a Bunsen burner or gas stove; heat slowly to about 200° of heat, for about two hours. This will evaporate the mercury, leaving the gold a silver gray in color. When the crown is cool, drop it into nitric acid, thus restoring the gold to its original color. Finish and burnish. The gold crown is now ready to be set.—O. H. Simpson, *Dental Summary.*

A Useful Application for Sore Lips while Operating.—I find that a little collodion is very useful to apply to sore lips before beginning to operate. It takes out the soreness, protects the lips, and they heal rapidly after the application. It is also useful to apply to wounds on the hands, as it reduces the danger of infection, and washing will not remove it.—W. J. Hemphill, *Dental Review.*

Where Porcelain Inlays should be Used.—Except the anterior teeth—where, on account of the conspicuous situation, artistic effect is as great a consideration as any other—porcelain inlays should never be placed where the margins are exposed to the stress of mastication. The observation of skilful practitioners of sound judgment demonstrates that the slight washing out of the cement at the margins—which is incident to all inlays set with cement—leaves the brittle margin of the inlay unsupported, so that it chips off under the direct stress of mastication, leaving the cement still more exposed, with the result that more of it washes out, leaving more unsupported brittle porcelain margin which further chips off, and so the process of destruction and disintegration continues to its usual end. Furthermore, the element of time must be considered in certain cases.

In the occlusal class of cavities and the buccal fissure cavities, gold fillings may be inserted in about the time it would take to fit a matrix, and also in cavities of the "pit" variety, where an inlay simply could not be inserted. Frequently, in compound approximo-occlusal cavities in bicuspids and molars, the mere cutting away of frail walls and of carious dentin and enamel gives the cavity a general retentive shape, requiring but very little cutting in certain places to complete the cavity preparation for the insertion of gold, while cavity preparation for an inlay would mean either extensive cutting away of sound tooth-structure or a very extensive wedging, both uncalled for and unjustifiable. And a gold filling properly inserted as regards cavity preparation, protection of the pulp against thermal shock, adaptation, condensation, and finish, is as good a preserver of the tooth-surface in which it has been placed as is the finest inlay that could be inserted.—J. E. Nyman, *Dental Summary.*

Mixing Amalgam.—Much has been said and written about "mixing amalgam," and many different methods have been described, from mixing with the thumb and finger in the palm of the hand to shaking portions of alloy and mercury in a bottle, or rolling them in a folded piece of rubber dam, and while much ingenuity has been displayed in these various methods they lead one to believe that many of the failures of this most abused filling material lie not so much in its own intrinsic qualities as in the way in which it is manipulated. It would be well for all users of amalgam to realize that there is a great difference between a mixture of alloy and mercury and a true amalgam. In the former the grains of alloy are amalgamated only on their surfaces, and while the mass may be workable, it will not give the best results of which the material may be capable.

A good, thoroughly amalgamated amalgam has no gritty or granular feeling when rubbed between the thumb and finger, and presents the appearance of a homogeneous mass. The best class of alloys in use at present are not easy to amalgamate, and it is doubtful if the best results can be obtained in any other way than by the use of mortar and pestle. Having determined by experiment what proportions of alloy and mercury will produce an amalgam of the right consistence, use these proportions in every instance. Having weighed the portions of alloy and mercury, place them in a glass or Wedgwood mortar, and rub them thoroughly. If they do not amalgamate readily, remove the mass to the palm of the hand and knead it carefully for some time with the thumb and finger, then replace in the mortar and give it a final rub. When the mass has lost all its granular appearance and feeling, it may be considered well amalgamated and ready for use. It may be possible to amalgamate some of the cheap "mostly tin" alloys by makeshift methods, but with good alloys uniform and lasting results can only be obtained by thorough amalgamation and uniform methods of procedure.—F. L. P., *Pacific Dental Gazette.*

Saving Time.—Present conditions of life engendered by the great competitive struggle for riches, or supremacy, or even existence, make of time the most valuable commodity, if it may be so considered, with which we have to deal. It is perhaps the one other thing, besides life, which when lost cannot be recovered or made up. There is no such thing as making up lost time—once lost it is gone forever—and while a given task may be hurried to completion in an effort to regain lost time, it is accomplished only at the expense of energy or quality of product not commensurate with the value of the time previously lost. Each succeeding generation, in its endeavor to accomplish more than its predecessor, places a greater value on time, and appreciates more and more highly the ability of those who can accomplish much in a little time. On every hand are evidences of these facts, for everywhere there is a demand for time-saving methods and devices, and each day witnesses a new effort to supply them. In no profession or pursuit is there greater need for saving time than in dentistry, for time is practically the "stock-in trade" of every practitioner, and one of the vital elements entering into the value of each operation performed. These considerations lead us to wonder why so many dentists work in unsuitable offices, with inefficient apparatus, and an apparent disregard for the value of time or the necessity for continuous and effective accomplishment. A review of the methods of successful and unsuccessful practitioners reveals not so much a difference in skill or quality of finished product, as in the ability of one to make every effort count and every hour of active work productive of its definite result, and the inability of the other to reach the objective point of his labor by the most direct and easily traversable route. Saving time in dentistry does not mean the neglect of detail, for this inevitably leads to its loss, but, briefly summed up, means the possession of skill and its systematic application to the task in hand, through the medium of the best appliances procurable, directed by an intelligent appreciation of the value of time and the necessity for following clean, efficient, satisfactory methods of practice.—Editor, *Pacific Dental Gazette.*

Remodeling of Ill-fitting Vulcanite Dentures.—The method consists of flasking the case in such a way that it can be removed bodily from the flask for the purpose of removing the teeth from the vulcanite and putting them back in the flask, thereby getting rid of the old vulcanite altogether. An impression of the mouth is taken in the usual way, either in plaster or composition, and cast. The case is then tried on the cast. It may not go on at all, or be so wabbly that it will be difficult to discover what position is the correct one, but all one has to do is to cut away freely any excrescences or edges or rugæ that are in the way. If I have any difficulty in seeing what is keeping it, I wriggle the case slightly on the cast and cut it away at the white plaster marks that are left on the under surface. The great thing, I find, is (in the case of uppers) to get the palatal portion of the case lying as flat as possible, for if this be right it is certain that the rest is, as it is not in the palate where changes occur in the mouth. All this can be done in a few minutes. The case is next waxed on to the cast and wax run into all the places to be filled up, but it is not necessary to have wax all the way under the case, as the edges are tight, to keep plaster from running in between it and the cast. Any teeth that require to be added are put on with wax, and any places where it is desirable to extend the case or add gum are waxed up. It may also be necessary to cover exposed pins, etc. The cast with the case on it is then placed in the lower part of the flask, and plaster brought up to the gum edge. The middle part of the flask is then lubricated inside with oil, vaselin, or soap and placed in position. Plaster is then run round the faces of the teeth and gum and crowns of the teeth. The plaster is then trimmed up, smoothed and lubricated, the palatal portion which remains filled in with plaster, and the top of the flask put on. When the plaster has set and the flask has been opened, the case will be found embedded in a ring of plaster in the middle part of the flask; this having been well lubricated allows the plaster with the case to be removed. The ring of plaster is then broken into three or four sections and the case liberated. These sections of plaster are now put back into the middle part of the flask, where they were before. The top part of the flask is then put on, and the lower part with the cast used as the plug; or it can be packed the other way if desired. The teeth are then removed from the case and fitted into their places in the plaster. If the back teeth are diatoric and the vulcanite will not come out of the holes, I have found that a very good way is to place them in a crown or inlay furnace and burn it out. I heat them till they are red-hot, when they will be found nice and clean.—T. Evans Johnston, *Dental Record.*

HINTS, QUERIES, AND COMMENTS.

DENTAL MANIPULATIONS AND EPITHELIOMA.

To the Editor of the Dental Cosmos:

Sir,—I had occasion recently to operate upon a man for an extensive epithelioma of the lower lip. The patient referred the beginning of his disease to the pulling and stretching of the lip by a dentist in the manipulations incident to the extraction of some of the lower teeth and the fitting of an artificial denture. A fissure was thereby produced, which never healed and which gradually underwent epitheliomatous degeneration.

This statement may or may not be true, but it occurs to me that it may serve as a warning to those practicing the dental branch of our profession to use the utmost gentleness in the handling of the lips, especially in those patients who are within the age limit of epithelioma—that is to say, over forty years of age. It is a well-recognized fact that epithelioma of the lip has its origin in some form of irritation; and violent manipulation of the lip, sufficient to crack the mucous membrane, might well supply that irritation.

Yours truly,

Edward A. Balloch, M.D.

Washington, D. C.

OBITUARY.

DR. ELI THOMPSON STARR.

Died, December 11, 1904, at the residence of his son-in-law, Mr. John Jolley, Jr., Bala, Pa., Dr. Eli T. Starr, in the seventy-first year of his age.

In the death of Dr. Starr there passed away a man whose life was closely interwoven with the gigantic strides in material progress which dentistry made during the last third of the nineteenth century. With a natural bent for invention, he entered the employ of Samuel S. White more than forty years ago, and from that time until disabled from active work by physical infirmities he was closely connected with the various improvements in dentists' instruments and appliances brought out by the house.

Eli Thompson Starr was of Quaker parentage, the son of Jeremiah and Mary (Thompson) Starr. The family traced its ancestry to John Starr, an Irish officer in Cromwell's army, who married at Ballytore, Ireland, Rebecca Jackson, of the family now so well known in Chester county, Pa., as the Irish Quaker family. Their five sons emigrated to America, and from one of them, Thomas, who came over with the first Quaker settlers, the subject of this sketch was descended. He was born in New Garden township, Chester county, Pa., January 7, 1834, and passed his childhood amid the pastoral scenes of a rural neighborhood. Like many other American boys, he tried his hand at more than one vocation before finding his life-work. His first regular employment was in a country store near his birthplace. Next he went to Wilmington, Del., and became connected as a clerk with the well-known shipping firm of Warner & Co. After a few years, having married, he started in business for himself in the manufacture of sheet-iron for tin-plates. This was shortly before the panic of 1857 swept over the land, engulfing many of the strongest business houses. Young Starr's slender resources proved insufficient to weather the storm, and his business was added to the other wrecks of the year.

He was then led to the study of dentistry through the influence of his father-in-law, Dr. Emmor Jefferis, at the time a leading dental

practitioner of Wilmington. In entering Dr. Jefferis' office he struck the note to which his natural energies were attuned, and thereafter his work was in and for dentistry. His preceptor was an expert in the carving of porcelain blocks, as they were called, an art which his student later found an invaluable acquirement. At this time also he acquired a knowledge of the fusing of porcelain, and of the carving of molds for porcelain teeth. Shortly after the completion of his pupilage, Dr. Starr attracted the attention of Dr. J. DeHaven White, of Philadelphia, with whom he became associated as assistant, remaining in that connection until he entered the employ of Dr. Samuel S. White in August 1862.

Up to this time there had been nothing remarkable in his career. He had gone the way of the average young energetic man, doing well what came to his hand, constantly striving to improve his skill in the practical work of his profession. The knowledge of the limitations of the appliances at the service of dentists thus gained, when brought into direct and daily contact with a stock which showed the entire resources of the profession, awakened within him the faculty of invention until then dormant. A series of new devices, mostly along the lines of prosthetic, or, as it was then universally called, "mechanical" dentistry was the result. Some of these early fruits of Dr. Starr's genius survive to this day, among them the Star reversible flask for vulcanizing, which, after more than forty years, is still one of the most popular in use by the profession.

Having proved his quality, Dr. Starr was placed in charge of the mold-making department of the tooth-factory. Under his guidance—often by the direct work of his hands, in which his early training stood him in good stead—the forms of the molds were improved, and many new and valuable forms added. He it was who, on the advent of celluloid as a base, conceived and brought out the line of molds whose product has since become widely known under the name of "natural" forms.

The era of dental machinery—the dental engine and its appurtenances, the modern dental chair—with the almost revolutionary change in modes of practice approached. In the development of both engines and chairs Dr. Starr bore a conspicuous part. The combination of the elements which make up the S. S. White Cable Engine, some of them invented for and originally applied to far different uses, is an excellent illustration of his ability. While himself an original inventor of merit, he excelled especially in bringing together ideas apparently unrelated and forming from them practical appliances whose worth was attested by the wide use to which many of them attained. Did difficulties arise in the course of the combination, he invented his way out of them. He was also quick to see the merits and the weaknesses of inventions offered for his approval or condemnation, and to suggest the means to perfect them. Many devices with which his name was never connected owed their success, in whole or in part, to some touch which he thus gave them.

For years he was one of the chief patent experts of the house for the examination of devices submitted for purchase, and his judgment was rarely wrong. The fecundity of his inventive talent is evidenced by the fact that nearly one hundred different patents were granted to him, covering nearly every department of dentistry. Besides chairs, engines, etc., heretofore referred to, Dr. Starr invented the modern form of the impression tray, and he devised a number of electrical devices for the use of dentists. He also patented forms of storage batteries and a system for lighting railroad trains by electricity.

For twenty-five years he was a familiar figure at dental conventions and association meetings. He was not specially prolific as a writer, but some of the papers which he contributed to the DENTAL COSMOS have been noteworthy. One of these, "A Contribution to the Study of Tooth-Forms," the result of years of investigation and involving a minute study of thousands of natural teeth, opened up a mine of information not theretofore developed.

The days of Dr. Starr's activity ceased some six or seven years ago, when locomotor ataxia supervened, incapacitating him from physical exertion. The disease progressed slowly but surely; finally dropsy developed, and the end came. Doubtless death was hastened through grieving for his faithful wife, who after a companionship of forty-seven years preceded him into the silent land last spring.

Dr. Starr was a man of strong convictions, an energetic, tireless worker. As has been stated, he had inventive genius of a high order. In certain departments of dentistry

his knowledge was almost absolute. It may be doubted if any man had a more thorough knowledge of porcelain teeth than had Dr. Starr. He knew them intimately through all the stages of manufacturing, from the mold-making and the preparation of the crude materials through the various processes by which the finished product was assured. He knew them in their utilitarian and esthetic uses. As a prosthetic dentist he had few equals; he stood in the front line with those who twenty years ago were reckoned the brightest ornaments of prosthetic dentistry.

In the house with which he was so long connected, and by dentists with whom his work brought him in contact, he was reckoned an able, forceful man. Rather bluff and outspoken in his address, he sometimes created a wrong impression among those who knew him but little. But he was really one of those who enjoyed being helpful, and he parted freely with the information along his chosen lines with which his mind was stored. He was a kind husband, an indulgent father, a good citizen.

Dr. Starr was married May 28, 1857, to Caroline Jefferis, the daughter of his preceptor in dentistry. His wife died in the spring of 1904. Of their seven children four survive—E. Eugene, an electrical engineer of Trenton, N. J.; Drs. R. Walter and Samuel E., both well-known and skilful practitioners of dentistry, the former in Philadelphia and the latter in Toledo, Ohio; and Annie, the wife of Mr. John Jolley, Jr.

The funeral services were held in Bala, by Rev. Dr. J. Addison Henry, who was the pastor of his church (Princeton Presbyterian), after which the remains were taken to Kennett Square, Pa., for interment.

F. L. H.

DR. GEORGE ALMON YOUNG.

Died, at Concord, N. H., November 11, 1904, in his seventy-first year, George Almon Young, D.D.S.

Dr. Young was born on a farm in the town of Sunapee, N. H., November 28, 1834. He entered upon the study of dentistry in 1861, in the office of Dr. E. G. Cummings of Concord, with whom he later on became associated. This professional partnership continued for twenty-three years, after which time Dr. Young established himself independently in the same city.

He was an ingenious operator, and held a high and honorable position in professional and social circles. He was president of the New England Dental Society for two terms, and afterward was its treasurer for several years. He was also treasurer of the Northeastern Dental Association for two years. He was a charter member of the New Hampshire Dental Society, its executive officer for one term, and its treasurer at the time of his death. He was also a member of several Masonic orders.

Dr. Young was an ardent republican, and served as chairman of the republican city committee for several years. He was a member of the Concord water board from 1885 to 1894, and of the park commission from 1890 to the time of his death. The only elective political office he ever held was that of representative in the New Hampshire Legislature in 1876. In December 1903 he become postmaster of Concord. In the fulfilment of the varied and perplexing duties of this office he displayed a marked degree of aptitude.

Dr. Young was a most devoted father and a true friend. His kindness and sympathetic nature were in evidence in all his acts, whether professional, social, or political. He was admired for his rare qualities of mind and heart.

He is survived by a widow, one daughter, Helen M., one son, Dr. William A., a practitioner of dentistry in Concord, and by a sister, Mrs. Hannah H. Muzzey of Sunapee.

DR. ALONZO H. SYLVESTER.

Died, in Berlin, Ger., January 10th, from a self-inflicted gunshot wound in the head, Alonzo H. Sylvester, D.D.S.

Dr. Sylvester was born at Hampden Corner, Me., and graduated from the Boston Dental College in 1871. Soon after completing his course of study he went to Berlin, where he rapidly attracted a large and influential *clientèle*, and later became court dentist. He enjoyed the friendship and patronage of the Emperor, who appointed him his private dentist and later conferred upon him the appointment of Royal Prussian Councillor. Dr. Sylvester derived an unusually large income

from his practice, but was nevertheless reported to have had financial difficulties. Recently he had suffered from a severe attack of influenza and for some days previous to his tragic death had talked incoherently.

Dr. Sylvester was twice married; first to a Boston lady, and second, about fifteen years ago, to an American resident of Germany. His parents are dead, but he has two sisters living in Minnesota. He was about sixty years of age and had resided in Berlin for about thirty years.

DENTAL LEGISLATION.

DENTAL LAW OF VERMONT.

An Act to Regulate the Practice of Dentistry.

It is hereby enacted by the General Assembly of the State of Vermont:

Section 1. A board of dental examiners is hereby created, which shall consist of five dental practitioners, to be appointed by the Governor in the month of November 1904, whose term of office shall be for one, two, three, four, and five years respectively from the first day of the following December; and annually thereafter the Governor shall appoint one examiner whose term of office shall be for five years from the first day of the following December, and until his successor is appointed. All vacancies shall be filled by the Governor.

Sec. 2. The meetings of the board shall be held annually or oftener on the call of three members, who shall give thirty days' notice thereof in at least three dental journals circulating in this state.

Sec. 3. Upon the payment of a fee of twenty-five dollars, the board of dental examiners shall at its meetings examine applications and grant licenses to such applicants as they shall find qualified. An applicant who fails to pass a satisfactory examination shall be entitled to a re-examination at any future meeting of the board without fee, but for any subsequent examination a fee of five dollars shall be paid.

Sec. 4. The members of the board of dental examiners shall receive three dollars and necessary expenses per day for time spent in examining applicants and granting licenses.

Sec. 5. If any person without a license practices dentistry he shall be punished by a fine of not more than one hundred dollars and not less than twenty-five dollars. But this section shall not apply to extracting teeth by a physician or surgeon licensed to practice in this state.

Sec. 6. The board of dental examiners shall keep a book in which it shall enter the name of each person licensed as provided for by this Act.

Sec. 7. A person who receives a license from the board of dental examiners shall, within thirty days from the date thereof, cause it to be recorded in the office of the Secretary of State, who shall be entitled to a fee of fifty cents for recording the same.

Sec. 8. If a person does not cause his license to be recorded within the time required by the preceding section, he shall forfeit the same, and shall not be re-licensed until he has paid the board a fee of twenty-five dollars.

Sec. 9. The board of dental examiners may without examination issue a license to practice to any dentist who shall have been in legal practice in some other state or territory for a period of at least five years, upon the certificate of the board of dental examiners or a like board of the state or territory in which such dentist was a practitioner, certifying his competency and that he is of good moral character; and upon the payment of twenty-five dollars.

Sec. 10. Any duly licensed dentist of this state who is desirous of changing his residence to that of another state shall upon application to the board of dental examiners receive a certificate which shall attest that he is a duly licensed dentist in the state of Vermont. The same shall be given without fee.

Sec. 11. Chapter 191 of the Vermont Statutes and all amendments thereto are hereby repealed.

Sec. 12. This Act shall take effect from its passage.

SOCIETY NOTES AND ANNOUNCEMENTS.

Joint Meeting.

SOUTHERN BRANCH OF THE NATIONAL DENTAL ASSOCIATION AND TENNESSEE STATE DENTAL ASSOCIATION.

THE joint meeting of the Southern Branch of the National Dental Association and the Tennessee State Dental Association will be held at Memphis, Tenn., February 21-24, 1905.

From the interest manifested, this promises to be the largest meeting in the history of the two associations. The railroads have given a rate of one and one-third fare on the certificate plan. The meeting will be held at the Hotel Gayoso, rooms $1.50 and $2.00 per day, European plan. Accommodations can be had at other hotels on the American plan, $2.00 per day. The exhibits of the various supply houses will be exceptionally attractive, embracing everything of interest to the dental profession.

PARTIAL PROGRAM.

Papers and Reports.

Chairman's Report. Dr. Jules J. Sarrazin, New Orleans, La.

"Prophylaxis in Dentistry." Dr. B. D. Brabson, Knoxville, Tenn. Discussion opened by Dr. N. N. Vann, Attalla, Ala., followed by Dr. Robin Adair, Atlanta, Ga.

"A Successful Introduction of Oral Prophylaxis Treatment into Practice." Dr. Robin Adair, Atlanta, Ga. Discussion opened by Dr. N. N. Vann, Attalla, Ala., followed by Dr. B. D. Brabson, Knoxville, Tenn.

Chairman's Report. Dr. R. Boyd Bogle, Nashville, Tenn.

Chairman's Report. Dr. August F. Sonntag, Waco, Tex.

Report. Dr. M. F. Finley, Washington, D. C.

"A Few Points in Inlay Work." Dr. E. P. Beadles, Danville, Va.

"Gold and Tin and Amalgam and Gold at Cervical Margin as an Excellent Material for Saving Teeth." Dr. S. D. Rambo, Marietta, Ga.

"Insulating Deep-Seated Cavities." Dr. T. T. Moore, Columbia, S. C.

(Title not given.) Dr. B. Holly Smith, Baltimore, Md.

Chairman's Report. Dr. J. E. Chace, Ocala, Fla.

Chairman's Report. Dr. Geo. S. Vann, Gadsden, Ala.

"Orthodontia." Dr. T. M. Milam, Little Rock, Ark.

"Orthodontia—Surgical and Mechanical." Dr. W. E. Grant, Louisville, Ky.

"Orthodontia—Successes and Failures." Dr. J. Lewis Walker, Norfolk, Va.

Chairman's Report. Dr. H. H. Johnson, Macon, Ga.

Chairman's Report. Dr. R. K. Luckie, Holly Springs, Miss.

Chairman's Report. Dr. Geo. W. Dick, Sumter, S. C.

"The Masters of Early Dentistry." (With lantern-slide pictures.) Dr. Burton Lee Thorpe, St. Louis, Mo.

"The Problem of Education." Dr. Arthur Hynes Fleming, Louisburg, N. C.

"Dental Education." Dr. W. G. Mason, Tampa, Fla.

"Diseases of the Antrum—a Practical Case." Dr. A. W. Meyer, Chattanooga, Tenn.

"The Education of Present and Prospective Dental Patients." Dr. J. C. Bogue, Harriman, Tenn.

Clinics.

Committee: Dr. Thos. P. Hinman, chairman, Atlanta, Ga.; Dr. J. L. Mewborn, Memphis, Tenn.

"Surgical Operation." Dr. Truman W. Brophy, Chicago, Ill.

"Showing New Attachment for Partial Plate and Removable Bridge." Dr. F. E. Roach, Chicago, Ill.

"Method of Ascertaining True Fusing of

Porcelain." Dr. D. O. M. LeCron, St. Louis, Mo.

(Title to be announced.) Dr. Burton Lee Thorpe, St. Louis, Mo.

"Appliance for Correction of Cross Teeth (Orthodontia)." Dr. L. M. Cowardin, Richmond, Va.

(Title to be announced.) Dr. F. L. Wood, Roanoke, Va.

"Manner of Insulating Deep-Seated Cavities." Dr. T. T. Moore, Columbia, S. C.

(Title to be announced.) Dr. A. M. Jackson, Macon, Ga.

"Articulated Piece of Bridge Work." Dr. Joseph Broughton, Atlanta, Ga.

"A Full Porcelain Crown and Bridge Eliminating All Baking." Dr. Geo. A. Louque, New Orleans, La.

"Taking of Plaster Impressions and Making of Casts for Orthodontia Work." Dr. W. O. Talbot, New Orleans, La.

"Demonstrating Use of Vernon's Gold." Dr. W. M. Slack, Memphis, Tenn.

"Cavity Preparation Extension for Prevention." Dr. J. A. Gardner, Memphis, Tenn.

"Orthodontia." Dr. J. W. Peete, Memphis, Tenn.

"Porcelain Inlay." Dr. C. E. Hines, Memphis, Tenn.

"Gold Inlay in Frail Incisors." Dr. W. J. Hunt, Memphis, Tenn.

"Porcelain without Platinum Base." Dr. C. H. Taylor, Memphis, Tenn.

"Instrumentation in Phagedenic Pericementitis." Dr. W. W. Brooks, Memphis, Tenn.

"Combination Filling Finished with Vernon's Gold." Dr. C. A. Tavel, Memphis, Tenn.

"Exhibition of Somnoform for Extraction of Teeth and Minor Surgical Operations." Dr. Eugene A. Johnson, Holly Springs, Miss.

"Method of Attaching Lost Incisor to Incisor or Cuspid by Means of Doweled Gold Inlay." Dr. W. D. Gaither, Memphis, Tenn.

"Gold Bridge Demonstrating Original Method of Securing Perfect Occlusion." Dr. H. M. Prettyman, Covington, Tenn.

"A Reinforcing Mallet." Dr. J. L. Mewborn, Memphis, Tenn.

"Abbey's Soft Foil Filling." Dr. W. C. Gillespie, Nashville, Tenn.

"Dentin Injection with Cocain and Mounting Davis Crown." Dr. Walter H. White, Nashville, Tenn.

Table Clinic—"Showing New Flask and Rubber Warmer and Method of Applying Tin Foil to Rubber." Dr. F. E. Buck, Jacksonville, Fla.

"Practical Demonstration of Inlay—Using a New Apparatus." Dr. Wm. H. Richards, Knoxville, Tenn.

"Capon Porcelain Front Crown." Dr. J. C. Bogue, Harriman, Tenn.

"Somnoform." Dr. R. Boyd Bogle, Nashville, Tenn.

"General Anesthesia." Dr. J. W. Winn, Nashville, Tenn.

Table Clinic. Dr. A. A. McClanahan, Springfield, Tenn.

"Pyorrhea." Dr. Wm. G. Whitsitt, Lebanon, Tenn.

"Pulp-Devitalization." Dr. P. D. Houston, Lewisburg, Tenn.

Table Clinic—"Orthodontia." Dr. Henry W. Morgan, Nashville, Tenn.

"Pyorrhea." Dr. Gordon White, Nashville, Tenn.

"Hoods." Dr. J. Y. Crawford, Nashville, Tenn.

Table Clinic—"Saddle Bridge, Thimble Porcelain Dummies." Dr. F. R. Sandusky, Nashville, Tenn.

CHAS. A. BLAND, *Ch'man Program Com.*,
Charlotte, N. C.

SECOND DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE next regular meeting of the Second District Dental Society of the State of New York will be held at the Kings County Medical Society Library building, Brooklyn, New York, Monday, February 13, 1905, at 8 P.M.

Dr. Herbert A. Pullen of Buffalo, N. Y., will read a paper entitled "Conservative Teachings of Occlusion." Dr. S. H. Guilford of Philadelphia, will follow with a paper entitled "When is Radical Treatment Justifiable in Orthodontia?"

The question of the evening will relate to the propriety or impropriety of extracting teeth in crowded arches for the purpose of aligning the others. The reading of the papers will be followed by a lantern exhibit of cases from practice furnished to Dr. Ottolengui for use on this occasion by Drs. Angle, Watson, Hawley, Ketcham, Lowry, Roberts, Stanley, Barnes, Goddard, and others. These will be exhibited with very brief descriptions.

The members of the following societies have been invited to attend: First District Dental Society (N. Y.), Institute of Stomatology (N. Y.), Central Dental Association (N. J.), Academy of Stomatology (Pa.), Pennsylvania Association of Dental Surgeons, New Haven Dental Association (Conn.), Hartford Dental Society (Conn.), American Academy of Dental Science (Mass.), and Boston and Tufts Dental Alumni Association (Mass.).

E. H. Babcock, *Cor. Sec'y.*

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The annual meeting of the National Association of Dental Examiners will be held at Buffalo, N. Y., commencing 10 A.M., July 24, 1905, and continuing until adjournment.

The hotel and assembly rooms for holding sessions will be announced later. Arrangements for members in the East have already been made with the Lackawanna Railroad, for reduced rates on the fast "de luxe" trains, leaving New York 10 A.M., 6.10 P.M., 8.45 P.M., and 2 A.M.

Chas. A. Meeker, *Sec'y,*
29 Fulton st., Newark, N. J.

NEW ORLEANS COLLEGE OF DENTISTRY.

Golden Anniversary Banquet.

On February 21, 1905, a golden anniversary banquet will be tendered by the dentists of New Orleans to Geo. J. Friedrichs, who graduated in dentistry February 21, 1855.

L. D. Archinard,
for Com. of Arrangements.

MONTANA STATE DENTAL SOCIETY.

The second annual meeting of the Montana State Dental Society will be held in Butte, Mont., February 20, 21, and 22, 1905.

Arrangements are being made for the coming meeting to be the very best ever held in the Northwest.

Two men from the East will be present to give clinics in both porcelain inlays and gold fillings.

Address all communications and applications for membership to

Geo. E. Longeway, *Sec'y,*
Great Falls, Montana.

VERMONT STATE DENTAL SOCIETY.

The twenty-ninth annual meeting of the Vermont State Dental Society will be held at Hotel Berwick, Rutland, March 15-17, 1905.

Thomas Mound, *Sec'y,*
Rutland, Vt.

CONNECTICUT STATE DENTAL ASSOCIATION.

The forty-first annual convention of the Connecticut State Dental Association will be held at New Haven, Conn., April 18 and 19, 1905.

F. Hindsley, *Sec'y,*
Bridgeport, Conn.

KENTUCKY STATE DENTAL ASSOCIATION.

The next annual meeting of the Kentucky State Dental Association will convene at Lexington, Ky., May 15 and 16, 1905.

We anticipate a most pleasant as well as profitable meeting, and a cordial invitation is extended to the profession.

W. M. Randall, *Sec'y,*
Masonic Bldg., Louisville, Ky.

PACIFIC COAST DENTAL CONGRESS.

A Dental Congress will be held in Portland, Oregon, at about the time of the next meeting of the American Medical Association (July 11th to 14th). We expect the active participation of many dentists west of the Rocky Mountains, and are particularly anxious to secure the support and attendance of prominent Eastern men.

Railroad rates to Portland this year will be exceedingly low on account of the Lewis and Clark Fair, and, by proper routing, Yellowstone Park, Puget Sound, and Southeastern Alaska may be visited on the north, and Yosemite Valley and San Francisco on the south, and Columbia river from Portland.

Arthur W. Chance,
Sec'y Temporary Committee,
809, 810 Dekum Bldg., Portland, Oregon.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

The next meeting of the Dental Society of the State of New York will be held at Albany, N. Y., May 12 and 13, 1905. We expect a large attendance.

Papers will be read by Dr. E. T. Darby, Philadelphia; Drs. S. G. Perry, and R. Ottolengui, New York; Drs. J. P. Buckley, W. T. Reeves, and A. H. Peck, Chicago.

The clinic committee, of which Dr. F. W. Proseus is chairman, are hard at work arranging an interesting program.

W. C. Deane, *Sec'y.*

MINNESOTA STATE DENTAL ASSOCIATION.

The twenty-second annual meeting of the Minnesota State Dental Association will be held in Minneapolis, Minn., on June 1, 2, and 3, 1905.

Geo. S. Todd, *Sec'y,*
Lake City, Minn.

QUONEHTACUT DENTAL CLUB.

The ninth annual meeting of the Quonehtacut Dental Club was held at the Heublein Hotel, Hartford, Conn., Saturday evening, December 10, 1904, in honor of the sixtieth anniversary of the discovery of anesthesia by Dr. Horace Wells. Dr. Alfred C. Fones, Bridgeport, Conn., the president, occupied the chair.

Twenty-five were present, including as guests Hon. A. Chamberlain, Governor of Connecticut, Hon. W. F. Henney, Mayor of Hartford, and Mr. Chas. T. Wells, the son of Horace Wells.

The following officers were elected: Geo. O. McLean, Hartford, president; Richard W. Browne, New London, vice-president; Chas. McManus, Hartford, secretary and treasurer.

The following new members were elected: Edward Eberle, Nelson J. Goodwin, and Chas. H. Riggs, Hartford; C. F. Gibbs and F. Hindsley, Bridgeport.

Chas. McManus, *Sec'y,*
Hartford, Conn.

NATIONAL DENTAL ASSOCIATION.

Coming Meeting—Section III.

In preparation for the meeting of the National Dental Association at Buffalo, N. Y., July 25 to 28, 1905, original papers and investigations are asked to be submitted upon the following topics: Oral surgery, anatomy, physiology, histology, pathology, etiology, hygiene, prophylaxis, materia medica, and allied subjects.

J. D. Patterson, *Ch'man Sect. III.,*
Kansas City, Mo.

NEW YORK AND NEW JERSEY STATE BOARDS OF EXAMINERS.

Agreement for Interchange of Licenses.

Minute of Agreement between the New York and New Jersey State Boards of Dental Examiners:

(1) It is understood and admitted that the standard of the professional examination of each board is practically equal, and though different in detail is mutually acceptable.

(2) Licentiates of the New Jersey Board who have received the degree of D.D.S., or other recognized dental degree, are to be granted licenses to practice in New York state without examination on payment of the regular licensing fee, provided the preliminary education of the candidate be equal to that required by the New York statute; and licentiates of the New York Board are to be granted licenses to practice in New Jersey under the same conditions.

(3) Immediately after any examination by either board complete sets of the questions used shall be mailed to the examiners of each state, to the State Dental Commission of New Jersey, and to the Examinations division of the Educational Department of the State of New York.

(4) Applications for license under this interchange agreement shall be indorsed, in New York state, by the president and secretary of the board of examiners, and by the first assistant commissioner of education, and in New Jersey by the president and secretary of the examining board and by the secretary

of the Dental Commission, and shall be accompanied by the original or certified copies of certificates of preliminary education.

(5) The names of unsuccessful candidates in each state shall be sent to the secretaries of the examining boards and to the Educational Department or Dental Commission as the case may be.

(6) All papers connected with the examinations shall be placed on file with the Educational Department or Dental Commission, and shall be public records.

(7) Those who have received a New York state license to practice dentistry granted since 1895, or a New Jersey license granted since 1895, may apply for the interchange established by this agreement.

(Signed) WILLIAM E. TRUEX,
CHAS. A. MEEKER,
For the New Jersey State Board of Registration and Examination in Dentistry.

WILLIAM CARR,
H. J. BURKHART,
For the New York State Board of Dental Examiners.

Approved December 29, 1904.

CHAS. A. MEEKER,
Sec'y State Dental Commission of New Jersey.

READING DENTAL SOCIETY.

THE seventh annual meeting of the Reading Dental Society was held January 5, 1905, at Reading, Pa., and the following officers were elected for the ensuing year: Chas. E. Grim, president; C. R. Scholl, vice-president; Geo. S. Schlegel, secretary; J. T. Bair, treasurer; W. H. Scholl, Otto J. Specker, E. W. Bohn, executive committee.

GEO. S. SCHLEGEL, *Sec'y.*

NEW YORK ODONTOLOGICAL SOCIETY.

AT the annual meeting of the New York Odontological Society, held at the New York Academy of Medicine, Tuesday evening, December 20, 1904, the following officers were elected for 1905: John I. Hart, president; F. T. Van Woert, vice-president; W. B. Dills, recording secretary; W. D. Tracy, corresponding secretary; F. C. Walker, treasurer; C. A. DuBois, curator; Wm. B. Dunning, editor.

ARIZONA BOARD OF DENTAL EXAMINERS.

THE Board of Dental Examiners of Arizona will meet in Phœnix, Ariz., February 23, 24, and 25, 1905, for the examination of all candidates desiring a license to practice dentistry in Arizona. Applications must be filed before February 18th, and all applicants must come prepared with instruments. Fee twenty-five dollars.

WM. G. LENTZ, *President,*
Fleming Block, Phœnix, Ariz.

MASSACHUSETTS BOARD OF REGISTRATION IN DENTISTRY.

A MEETING of the Massachusetts Board of Registration in Dentistry for the examination of candidates will be held in Boston, Mass., March 8, 9, and 10, 1905.

All applications, together with the fee of twenty dollars, must be filed with the secretary of the Board on or before March 1st, as no application for this meeting will be received after that date. (Hereafter candidates for second and subsequent examinations will be required to fill out an application blank and forward it to the secretary as above.)

G. E. MITCHELL, *Sec'y,*
Haverhill, Mass.

ARMY DENTAL CORPS.

THE following named dental surgeons are relieved from duty in the Philippines Division, to take effect as soon as practicable after the dates set opposite their respective names, and will report for transportation on the first available transport sailing from Manila to San Francisco, Cal.: John A. McAllister, March 10, 1905; John D. Millikin, April 14, 1905; George H. Casaday, April 21, 1905; Julien R. Bernheim, May 27, 1905. (Jan. 18, W. D.)

Dental Surg. Charles J. Long will upon the expiration of his present leave of absence proceed to Fort Snelling, Minn., for duty, relieving Dental Surg. Samuel W. Hussey, who will proceed to San Francisco for transportation to the Philippine Islands on the transport to sail from San Francisco on or about March 1, 1905. (Jan. 18, W. D.)

SWEDISH DENTAL SOCIETY.

NOTICE OF PRIZE COMPETITION.

THE Swedish Dental Society announces the opening of a competition for the writing of a popular treatise, to be entitled "The Teeth and Their Care," intended for liberal distribution by the members of the society among persons of those classes in which hygienic care of the mouth is practically unknown. The treatise must be written in the Swedish language, and must not exceed one printed sheet. The competition is open to all members of the dental profession.

Each essay should bear a motto or mark, and should be accompanied by a sealed envelope containing on the outside the same motto or mark, but bearing no indication as to its origin, and within containing the name and address of the author. The essay, preferably typewritten, should be forwarded, duly signed, not later than February 28, 1905, to the "Jury of the Swedish Dental Society," 19 Drottninggatan, Stockholm.

The committee appointed to pass on the merits of the essays that may be submitted will primarily consider whether they fulfill the purpose of a popular treatise on the teeth and their care intended for the instruction of the rising generation in the schools and the information of the lower classes of the people. The essay should embody a plain and easily assimilable statement of the subject, free from dry details and needlessly lengthy descriptions. Original illustrations or reproductions of any already published may be incorporated to facilitate the understanding of the text. Authors should base their statements on strictly scientific facts, excluding hypotheses and doubtful theories.

The awards will be—First prize, 700 kroner ($185); second prize, 300 kroner ($80).

The jury appointed by the society consists of the following members: Profs. E. Almqvist and A. Lindström, with Prof. C. Wallis as alternate; also, Drs. V. Bensow, E. Förberg, and G. Forssman, with Dr. G. Modin as alternate.

The prize essays to become the property of the Swedish Dental Society.

On behalf of the Swedish Dental Society,

EMIL CHRISTENSON,
HARALD RAMBERG.

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING DECEMBER 1904.

December 6.

No. 776,718, to CALVIN M. BEAM. Matrix-holding device for filling teeth.

No. 776,833, to ALBERT GOEBEL. Dental vulcanizer.

No. 776,834, to ALBERT GOEBEL. Safety-valve and blow-off.

December 13.

No. 777,521, to MILES L. LOEB. Detachable tooth-facing for bridgework or gold plates

December 20.

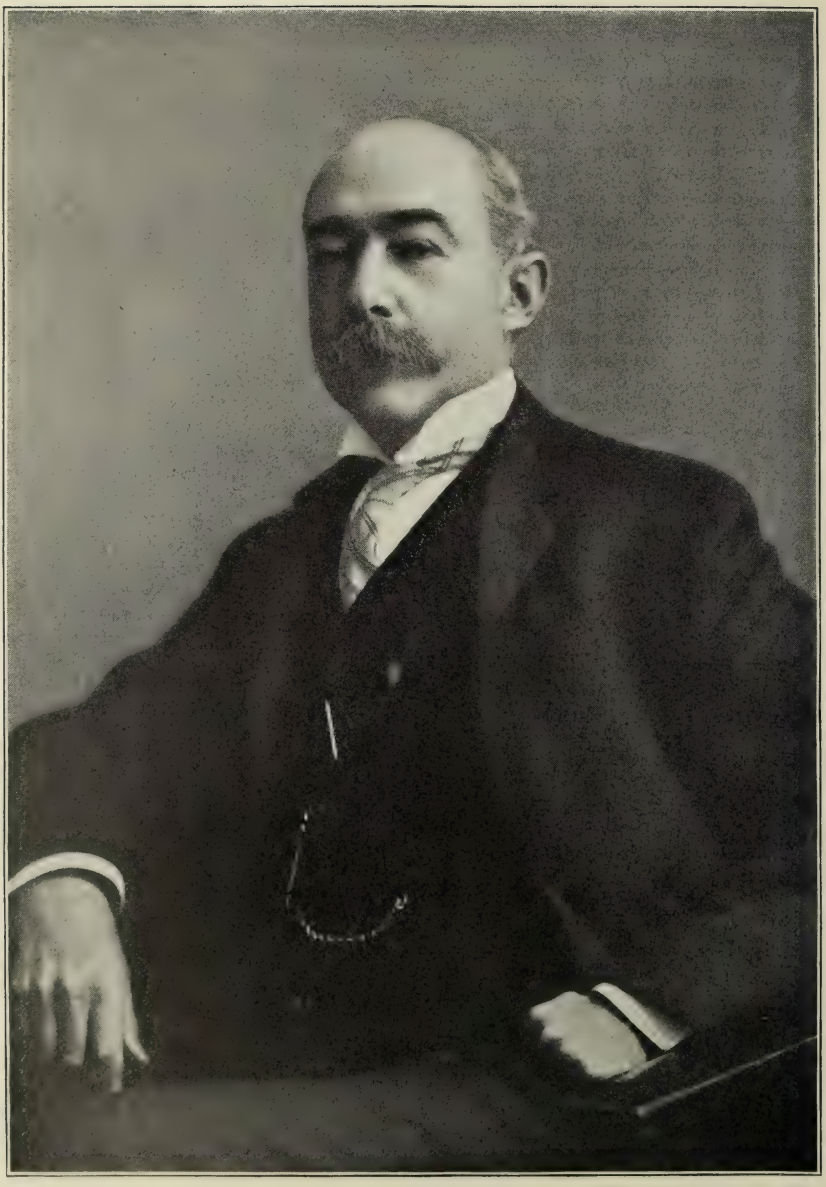
No. 777,766, to GEORGE W. ARCHER. Foot-rest for chairs.

No. 777,821, to ROBERT WALKER. Dental separator.

December 27.

No. 778,567, to MARCUS A. COYKENDALL. Grinder for tooth-crowns.

No. 778,650, to EMIL FORQUIGNON. Dental tool.



MR. N. S. TOWNER.

THE

DENTAL COSMOS.

VOL. XLVII. MARCH 1905. No. 3.

ORIGINAL COMMUNICATIONS.

CORRECTION AND PREVENTION OF MALOCCLUSION BY THE BITE GUIDE AND OTHER METHODS.*

By Dr. WILLIAM S. DAVENPORT, Paris, France.

(Read before Section VI, Fourth International Dental Congress, St. Louis, Mo., August 30, 1904.)

A THOROUGH knowledge of the intricate factors involved in the dental articulation is the foundation on which all questions of orthodontia are being solved.

For the first time in the history of dentistry there seems to be some unity of idea in the treatment of cases requiring regulation. Many are donating their ideas, inventions, and methods to the common cause, all of which are being classified and compiled by a certain few. Extremists are becoming broader in their views, and all are more anxious to accept the good, and to give credit where credit is due.

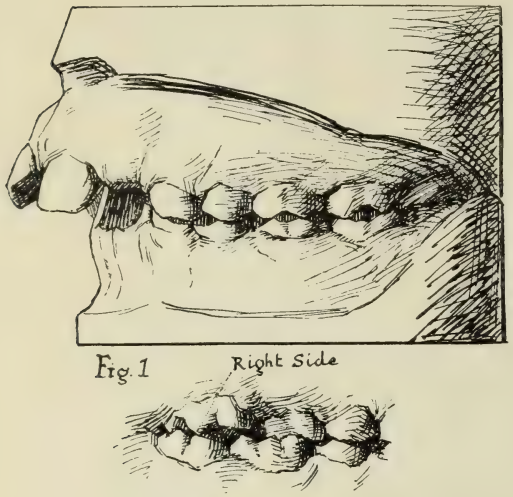
Years ago, Dr. Norman W. Kingsley published his method of using an appliance, involving the inclined plane, for "jumping the bite." Since then, Drs. Angle, McBride, and others have introduced methods of retaining the lower arch forward, in cases of this class, by cementing fixtures to the teeth.

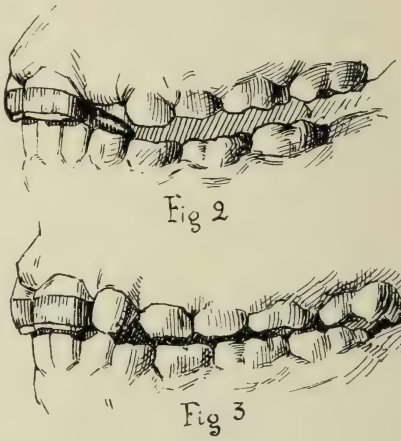
The "bite guide" I have the honor of presenting is a modification of the Kingsley plate. It is an inclined plane of gold, soldered to bands which are afterward cemented to the upper incisors, especially the two centrals. The lower incisors strike against this plane with a sliding motion, and the whole lower arch is guided forward to the position desired. It will be of interest to the profession to know that, when my paper was prepared for the press, I first learned, through the July number of the *International Dental Journal,* page 492, that Dr. Ainsworth had been working on the same lines, and had presented the bite guide, or what he terms "inclined plane for jumping the bite and adjusting the articulation," before the New York Institute of Stomatology, on May 1, 1904. This is of interest, and it only confirms my statement that many of us are working on the same lines and for the common cause.

My first use of the bite guide was in November 1902. Soon after that I presented my first case before the American

* [The illustration blocks used in this paper were furnished by the author.—ED.]

Dental Club of Paris, and it has been used since by a number of my colleagues in Paris. In this word of explanation I am not trying to establish priority of

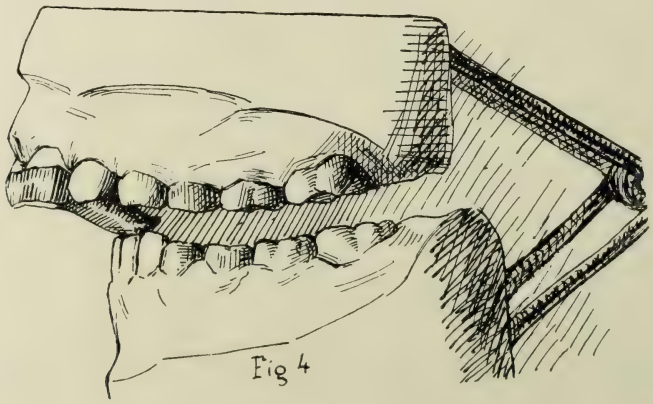




treatment, or usurp any honor belonging to Dr. Ainsworth, and I feel sure it matters as little to one as to the other who was the first to cement the "Kingsley inclined plane for jumping the bite" to the teeth.

The great advantage of the bite guide is that it can be applied at an early age, when the eruption of the teeth and the growth of the maxilla and mandible are easily influenced, and can be used to prevent as well as to correct deformities.

The bite guide is an effective retainer and can be worn indefinitely without injury to the teeth, and it will be seen by the following cases that it may be used in connection with various jump-bite, spreading, and retracting appliances. In



the greater proportion of irregularities there is an abnormal curve of the dental arch, and an excessive overshutting of the front teeth. The bite guide plays an important rôle in such cases, as it relieves pressure from the back teeth and brings force to bear on the front teeth,

which helps to establish the normal curves of the arches. It also tends to draw the upper teeth backward and prevents the elongation of the front teeth, which is apt to occur when using the "intermaxillary elastics" as an aid in jumping the bite or elongating the back teeth. I take the liberty of adopting Dr. Angle's valuable classification in the following cases.

CASES.

Case I. (This case comes under the head of class 2, 1st division.) An American girl eight years of age. Her brother has the same deformity. Nose and throat are in healthy condition. In the treatment of this case the centrals were rotated into line by means of a silk ligature; the bite guide was made and cemented to the centrals.

Fig. 1 shows the case before treatment. Fig. 2 shows the general relation of the teeth with the bite guide in place. Fig. 3 shows the condition of the teeth after four months' use of the fixture. Fig. 4 shows the awkward position of the teeth when the patient attempts to bite in the original position. Fig. 5 is a photograph of the patient before and after treatment. The teeth took forward position at once, and the patient experienced no difficulties. The fixture will be kept in place until the bicuspids erupt and all the teeth articulate.

Case II. (Class 2, 1st division.) Spanish-American girl, nine years of age; a mouth-breather; had tonsils removed at her sixth year. The only case in the family.



Fig. 5

Fig. 6 shows the case before treatment. Fig. 7 shows the condition after the use of the bite guide for six months, no attention being required in the meantime.

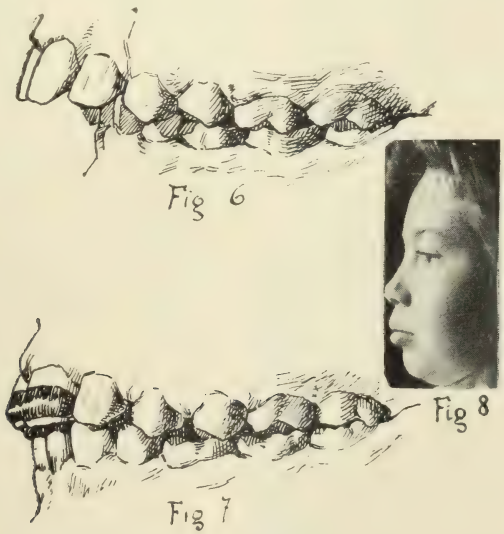


Fig. 8 shows a photograph of the patient before treatment.

The patient will continue with the fixture applied until the bicuspids are well in place. The lower arch may require some attention later on.

Case III. (Is developing into class 2, 1st division.) A French boy nine years of age, suffering from enlarged tonsils; dition after six months' use of the bite guide.

The patient will continue with the fix-

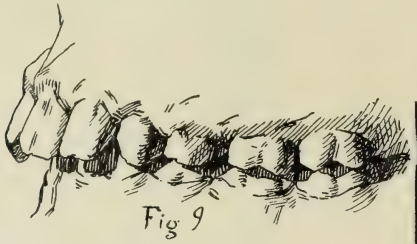


Fig. 9



Fig. 11



Fig. 10

treated several times with electric cautery; a mouth-breather. The mother of ture applied until the bicuspids are well in place. A photograph of the face (Fig.

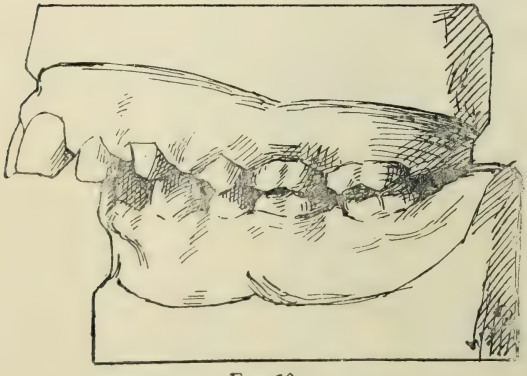


Fig. 12

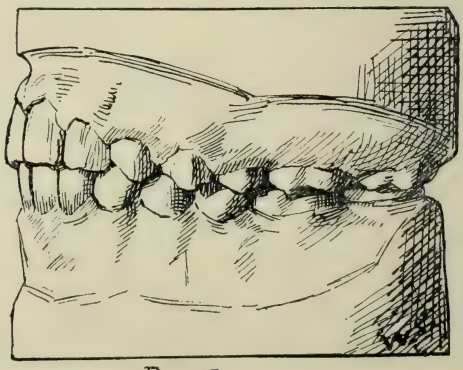


Fig. 13

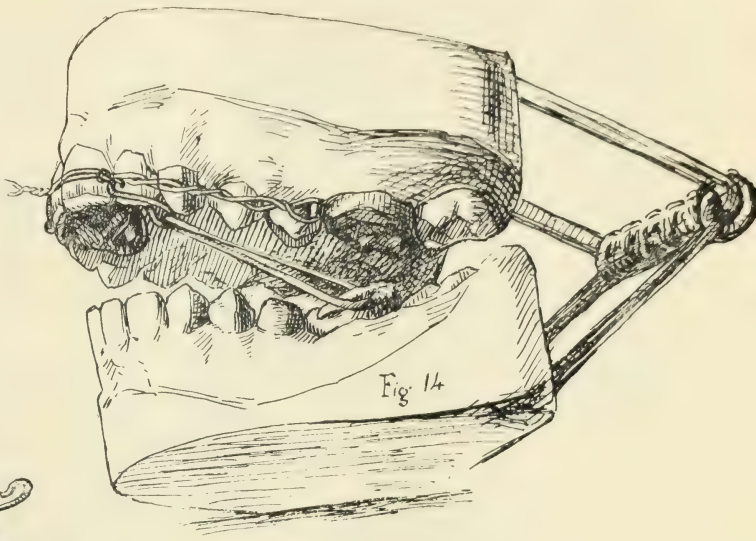
the boy presents a similar condition of the teeth.

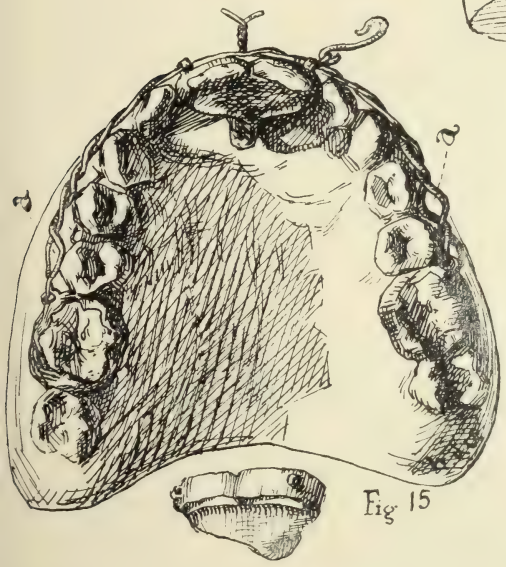
Fig. 9 shows the condition of the teeth before treatment. Fig. 10 shows the con- 11) shows slight protrusion of the upper lip and receding lower jaw.

Case IV. (Class 2, 1st division.) A

Greek girl of twelve years. The throat and nose in healthy condition. The patient has in an exaggerated way a deformity similar to that of her mother, and the habit of biting the inside of the upper lip.

Fig. 12 shows the case before treatment. Fig. 13 shows the condition after treatment. Fig. 14


Fig. 14


Fig. 15

illustrates the bite guide in position working jointly with a retractor of twisted wire. The "intermaxillary elastic" on the left side is used to correct the deviation from the median line, and at the same time to draw the left lower molar into proper position.

Fig. 15 shows two positions of the bite guide; also two gold caps —all of which have gold loops soldered to them through which the twisted wire retractor is applied. Note the nature of the twist in the wire, also openings (*a, a*) through which an instrument may be passed for twisting the wires, which applies force.

Fig. 16 shows photographs before and after treatment. The treatment of this case has extended over eighteen months, and it will require constant watching and night retention with a plate, as the tendency is for the upper front teeth to move forward. The teeth are small and pointed, thus making it difficult to establish the "interlocking articulation" that is so necessary for self-retention.


Fig. 16

Case V. (Class 2, 2d division.) A Russian girl, twelve years of age. At the eighth year the tonsils were removed, and polypi at the twelfth year.

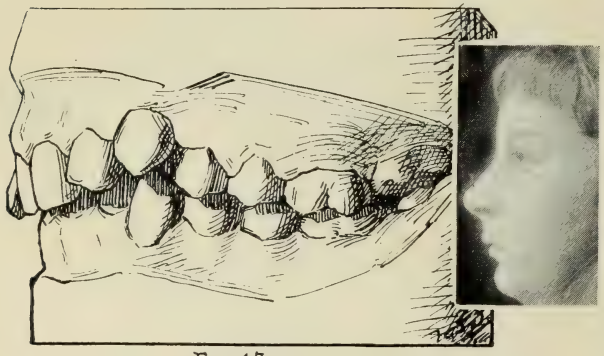


Fig. 17.

Fig. 17 shows a photograph of the face, also the condition of the teeth before treatment. Figs. 18 and 19 illustrate the use of the bite guide in combination with various established methods. A hook is soldered at the front of the bite guide, against which screw pressure from the Angle "expansion arch E" is brought to bear in such a manner as to draw all the front teeth forward; and at the same time both arches are expanded. The lower and back teeth were elongated, the abnormal curve corrected, and the mandible jumped forward by means of the intermaxillary elastics.

The bite guide relieves pressure on the back teeth, thus making it easier to draw the teeth upward, and at the same time prevents the elongation of the front teeth during the constant application of the intermaxillary elastics.

Case VI. (Class 2, 1st division.) A French girl, twelve years of age. The mother has the same irregularity, though less marked.

Fig. 20 shows the case before treatment. Fig. 21 shows the case after two years' treatment to be still under class 2, subdivision of 1st division—that is, the right lateral half only is in distal occlusion.

Fig. 22 shows photographs of the face before and after treatment. Note flat upper lip of the second picture; the failure to obtain perfect results in this case is due to bad diagnosis and also faulty use of appliances. First, I made an error in considering this case one of anterior protrusion. Secondly, in drawing the upper front teeth backward, when they should all have been moved

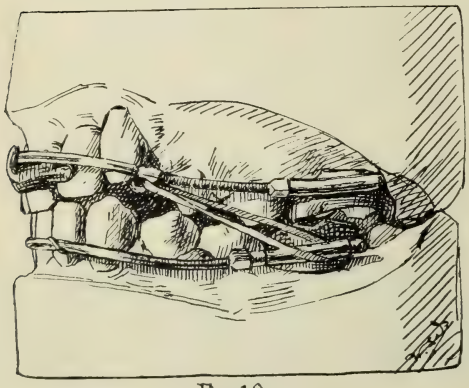


Fig. 18.

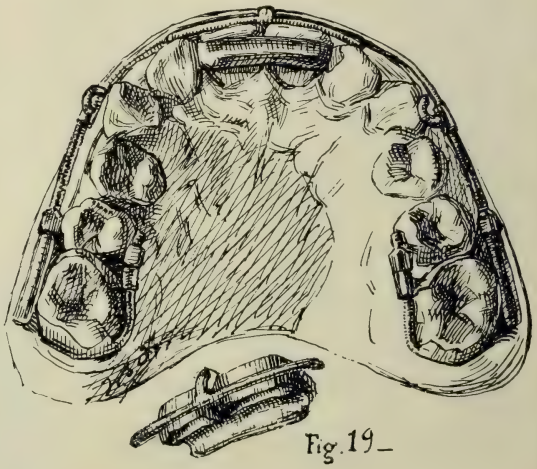


Fig. 19.

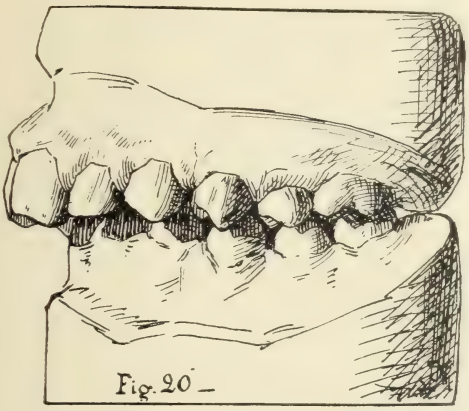


Fig. 20.



Fig. 22.

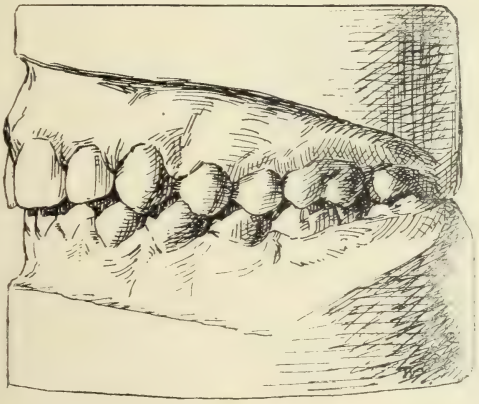


Fig. 21.



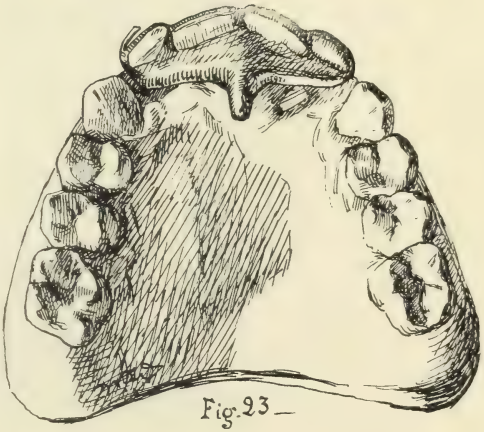


Fig. 23.

forward. Thirdly, in applying the bite guide to the teeth while still in an irregular position. (See Fig. 23.) Fourthly, in attempting to jump the mandible forward when there was no room for the teeth owing to the irregularity of the front teeth and the general crowded condition. Fig. 24 illustrates an impossible attempt to better this unfortunate condition.

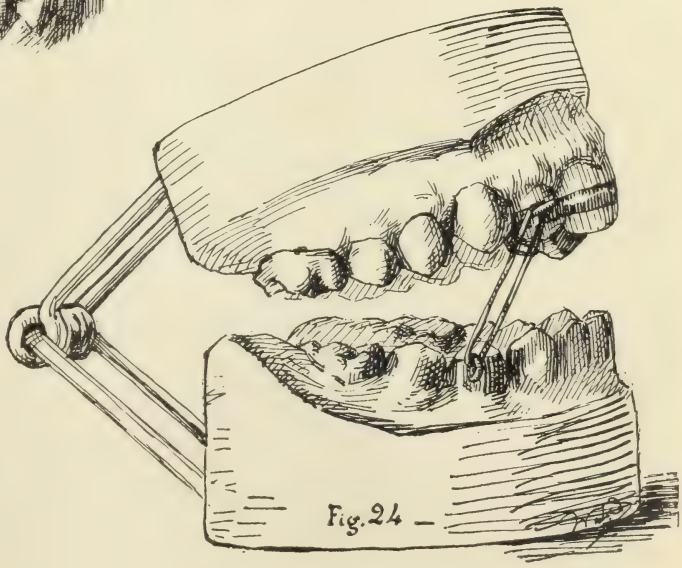
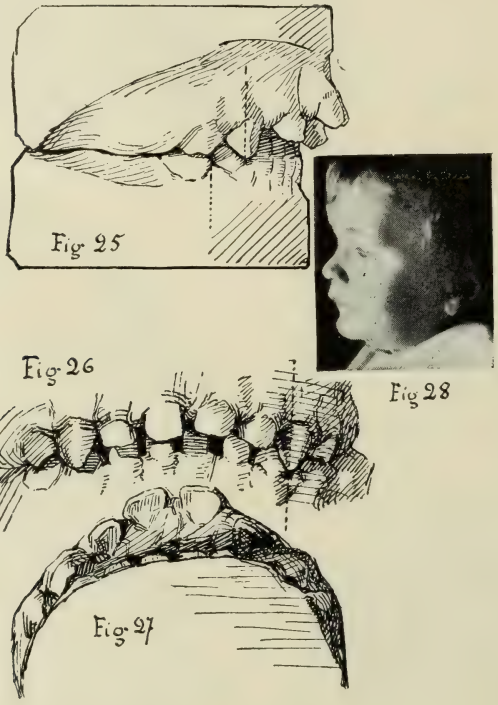


Fig. 24.

When should we begin the treatment of similar cases? I believe that Dr. Bogue—one of the great advocates of early treatment—advises beginning as soon as the permanent first molars are sufficiently developed to hold an appliance. In 1897, Dr. I. B. Davenport presented before the American Dental Club is our duty as a profession to instruct parents what a normal condition is, and to bring their children to us as soon as they have teeth. We shall then be able to see if irregularities are forming, and to advise in regard to abnormal conditions of adjacent organs, or warn against bad habits which might prove detrimen-



of Paris the case of his son (class 1) when he began treatment, by using plates, before the child was three years old. As will be seen by the foregoing cases, I have begun treatment as soon as the centrals were well in place.

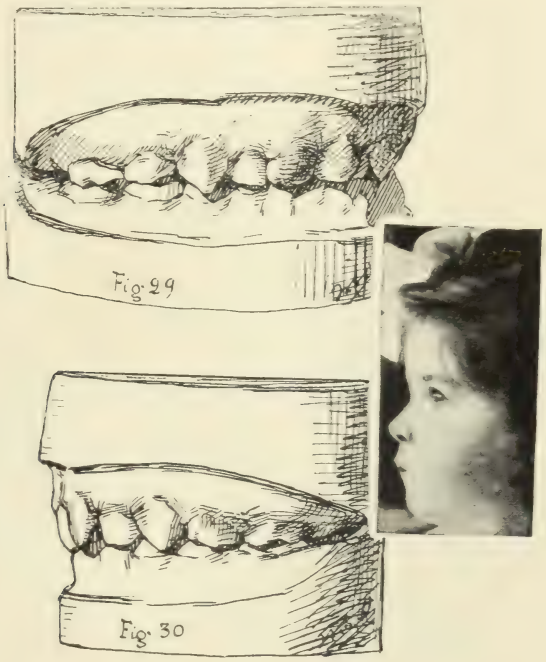
There is no doubt in my mind that in the near future orthodontia will develop, like other branches of dentistry, into preventive rather than curative methods. We have all observed the susceptibility of the teeth and jaws at an early age, and how diseased organs and bad habits soon play havoc with the harmony of the dental arches.

With these important facts in view, it tal. I remember as a small boy, on the advice of my brother, having rotated two very irregular centrals into line by constantly applying force to the teeth with my fingers. Working along this line, I believe that much can be accomplished in preventing the development of deformities if proper treatment and attention be given in time.

Case VII. (Class 2, subdivision of 1st division.) An American boy, two years of age. First case recorded in the family. Breathing and throat normal.

Figs. 25 and 27 show the retracted condition of the mandible on the right

side, while Fig. 26 illustrates the normal occlusion of the teeth on the left side. Fig. 28 is a photograph of the patient before treatment. I have explained to the parents and nurse of the child the faulty conditions existing, and have advised them to model the child's teeth into a normal condition. They are instructed to use finger force several times daily in the region of the upper right canine, as well as all the lower front teeth, pressing all the teeth outward.



Case VIII. An American child, two-and-a-half years of age. This case is developing into class 2, 2d division. The child has large tonsils but breathes normally.

Figs. 29 and 30 show the excessive overshutting of the front teeth and the faulty articulation of all the teeth. The patient, being my child, is undergoing a systematic finger-pressure treatment. The front teeth and alveoli are being pressed forward several times a day. The child is amused by the treatment, and I hope to be able to improve the present condition so that when the first molars erupt they will be able to take their proper positions.

ANESTHESIA FOR ORAL OPERATIONS.

By THOMAS FILLEBROWN, M.D., D.M.D.,
PROFESSOR OF OPERATIVE DENTISTRY AND ORAL SURGERY, HARVARD UNIVERSITY.

(Presented to Section V, Fourth International Dental Congress, St. Louis, Mo., September 1, 1904.)

THE difficulties attending the maintenance of the anesthetic state during surgical operations in and about the mouth are too apparent to need any description. In most cases more time is occupied in waiting for the administration of the drug than is taken up by the operation. Nor can an even anesthesia be maintained, as it is of course necessary to remove the inhaler from the face while the operator proceeds. By the ordinary methods of giving ether or chloroform an intermittent anesthesia is the best that can be produced. I suffered so much annoyance on this account that I tried the Junker method and injected the ether vapor through the nares. One trial proved that with so much blood and mucus in the throat as gathers during a cleft palate operation the apparatus was quite inadequate, consequently I set myself to work to devise one that would accomplish what I desired.

My first effort was successful. The apparatus is shown in Fig. 1, reproduced from the DENTAL COSMOS for December 1895.

The current of vapor issuing from the tube is so large that it leaves no margin of air for the patient to breathe. A mouth-gag is essential to success with this apparatus. It is also essential that the tongue be drawn forward as described farther on. When the retractor tube is used, it is very important that the nostrils be plugged, to prevent inspiration through the nose. Sometimes patients are inclined to close the throat and breathe through the nose, thus inspiring air unmixed with ether.

With this simple apparatus complete anesthesia may be maintained for any length of time while any operation on the face or within the mouth of the patient is being performed, and the operator will not be interfered with any more than during an operation on any other part of the body. An assistant can use the sponge freely and keep the throat clear of blood and mucus. Fig. 1 shows all the parts, and will make the explanation clear.

The *management of the tongue* is of great importance in oral surgery. It is our invariable practice to secure control of this organ by a ligature passed through the tip, of sufficient length to be held by an assistant some distance away. In this way the tongue is continually under control, and by gentle traction free respiration can be constantly maintained and stertorous breathing avoided. We are also enabled to remove clots, blood, and mucus from the throat with greater facility. Furthermore, a depressor can be used without crowding the tongue down over the glottis.

Later I have used a warm-water bath to keep up the temperature of the ether, which will soon by its own evaporation become so cold that it will not evaporate freely, and the air which is delivered to the patient will not be fully saturated with the anesthetic vapor. This is all that is essential for any one anesthetic.

For convenience I have attached to the water bath a second wash-bottle to contain chloroform or other drugs, so that it is always ready for use. I have also devised a valve that controls the strength of vapor passing to the patient. This has proved very satisfactory, as many patients require but very little anesthetic and sometimes, for quite a period, almost none.

For my own use I have connected the

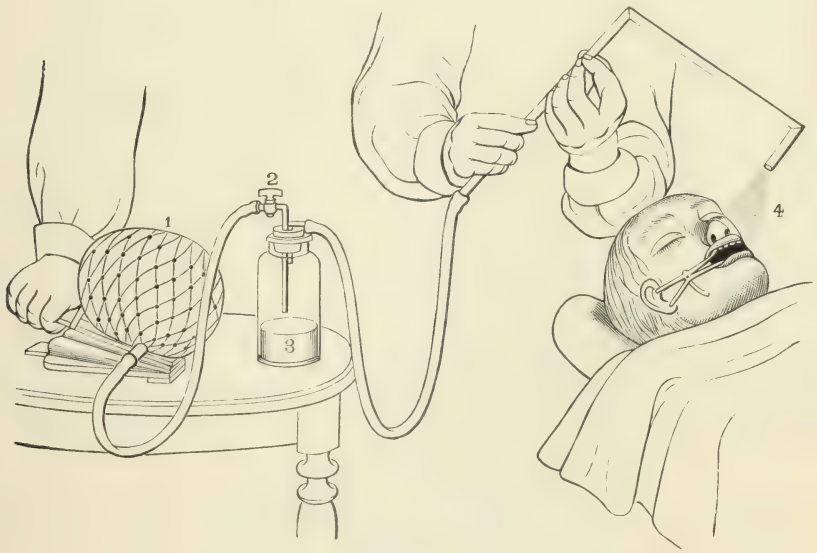
bellows and tubes with both bottles by a Y tube so that by the turn of a valve I can change from one anesthetic to the other, or give a mixture of the two. (See Fig. 4.) I have also substituted the small double-action foot bellows for the large one formerly used, and find it much better. At the suggestion of Dr. C. D. Fillebrown I constructed another delivery attachment adapted to the Whitehead mouth-gag. This is formed from a metal tube four inches long and flattened for about two-thirds of its length. This portion is formed on the plan of a fish-hook, and has a lip extending a little beyond the flattened orifice in the line of concavity. The other end secures the end of the rubber tubing from the bottles, and is provided with a small plate soldered on lengthwise containing two perforations. This attachment fits nicely into the corner of the mouth with the extension lip resting against the inner side of the cheek and the orifice directed inward, while at the other end the perforated plate is adjusted loosely over the pin projecting from the gag, producing gentle outward traction. In this we have a combined delivery tube and retractor, which having once been adjusted requires no other further attention.

For retracting the other side of the mouth a thin plate was made with the same curves and perforations as the former, and secured in the same way on the other side of the gag, with two points of attachment furnished by the perforations in the stem of the retractor. The tension can be regulated to adapt them to mouths of different sizes.

I found the Whitehead mouth-gag for general use to be the best made, on account of its self-retaining quality. The tongue-depressor attachment I at once removed, as it pressed the tongue back and obstructed the breathing. I also found the continuity of the wire across the palate a hindrance to reaching an anterior fissure of the palate.

My modification of the Whitehead mouth-gag has remedied this by removing a section at this point and turning the remaining ends in such a manner that they would impinge upon the palatal surface of the mouth and some of the anterior teeth, whatever the size or shape of the arch. The strength of the bar thus sacrificed was restored by a bow of heavy

Fig. 1.



wire brazed on at points some distance out on each side. As a result of this change nothing presents for a considerable width in the median line, and the field is unobstructed, while the self-retaining qualities of the gag are preserved. Fig. 2 shows the gag as improved. To accommodate a wide lateral fissure the points may be moved a little to the right or left as the case demands without disarranging the instrument.

Fig. 3 shows the gag adjusted in the

Fig. 2.

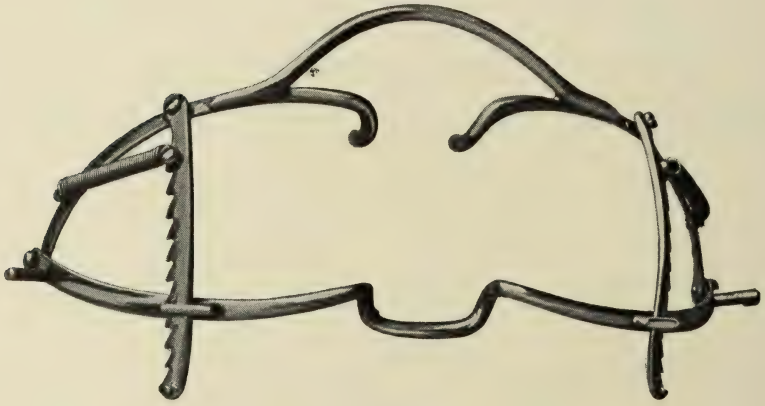


Fig. 3.



mouth with the retractor and vapor tube attached.

Finally, to enumerate the merits of this modified Whitehead gag, we have here an instrument which combines lightness and strength, having curves which conform to the face and present no awkward pojections. It may be used in mouths of any size without alteration. With cushions on the impinging points it may be applied successfully to edentulous subjects of all ages. Its adjustment is easy, and it is self-retaining. I have used this gag successfully and conveniently during a lengthy operation in the mouth of an infant ten months old.

Fig. 4 shows the apparatus entire, the bellows being placed on the table to bring it better into view in the photograph.

The apparatus is now made and is for sale by a responsible concern and is at the present time used in at least four of the public hospitals in Boston and in a number of private institutions.

The mouth-gag as improved and an apparatus as described makes the operation for cleft palate much shorter in time and easier of manipulation.

Fig. 4.



OIL OF YLANG-YLANG AS A DENTAL REMEDY.

By LOUIS OTTOFY, D.D.S., Manila, P. I.

(Read before Section IV, Fourth International Dental Congress, St. Louis, Mo., August 30, 1904.)

INASMUCH as Ylang-ylang has never been used as a medicinal agent, and therefore no description of the tree and flower or the oil distilled from the latter is accessible to the medical or dental student, I deem it advisable to preface a description of its medical properties by giving a botanical *résumé* and such other facts relating to the commercial phase of the subject as I have been able to obtain.

The term *ylang-ylang* means the "flower of flowers." The tree from which the flowers are taken is known as the *Cananga odorata* and belongs to the natural order of *Anonaceæ*. The oil distilled from the flowers is known as ylang-ylang oil (sometimes spelled "ilang-ilang" and also "yhlang-yhlang"), oleum anonæ, oleum canangæ, oil of cananga, and essence of ylang-ylang. The tree is indigenous to the entire south of Asia and the Philippine Islands. The first knowledge of the tree reached European literature through the investigations of John Ray (1628-1705). It was transplanted from Sumatra to the botanical gardens at Calcutta in 1797, and in 1809 the trunk of the tree was thirty-six inches in diameter four feet from the ground and proportionately tall. The tree attains an average height of sixty feet, the trunk is straight throughout, with smooth, colored bark, and having but few profusely ramified diverging branches; the young shoots are round and smooth. The leaves are short-petioled, drooping, ovate-lanceolate and acuminate, with their margins entire but waved and slightly downy along the nerves of the underside. They are arranged in two rows, and attain a length of four to seven inches and a breadth of two to three inches. The handsome and conspicuous flowers are in fascicles, generally three, sometimes four, on short peduncles from the axils of the leaves or the shoots of the former year's growth and from the nodes of leafless branches. These large bell-shaped, gradually drooping flowers are of a pale yellow or greenish yellow color and possess a most exquisite perfume, which is frequently compared to a mixture of hyacinth, narcissus, and clove, and sometimes to a mixture of jasmine and lilac. The lobes of the tripartite leathery calyx are finally recurvate. The six lanceolate petals soon spread out flat and grow to a length of two and three-quarters of an inch and a breadth of about half an inch, and are longitudinally veined. The filaments are somewhat numerous. The elevated receptacle is slightly flattened or depressed on the summit. The green, berry-like fruit is formed of fifteen to twenty rather long-stalked separate carpels, which inclose from three to eight seeds arranged in two rows.

The first correct description of the plant was made in 1829 by Blumie. Notwithstanding the superb odor of the flowers and the feverish search of the entire Malay Archipelago for useful commercial products, the distillation of the oil was not begun until the sixties in the last century, on the island of Luzon in the Philippines, and the oil first reached Europe in 1864, when in Paris and London its choice fragrance received immediate recognition. It was, however, first brought to general notice by an exhibit of the oil at the Paris Exposition of 1878.

The distillation is carried on principally on the island of Luzon, in the

Philippines, and on the island of Java. Where the trees are crowded and uncultivated they produce less oil and that of a minor fragrance. The yield is said to be approximately six drams of the oil from thirteen pounds of the flowers (twenty-five grams of oil from five kilograms of flowers)—hence the oil is very expensive; the value given at the custom house in Manila (probably underrated) is a fraction of over twenty dollars in United States currency per gallon. On this point the information I have been able to secure in Manila is extremely variable. I have been informed by good authority that five hundred pounds of the best flowers will yield two pounds of the best oil, and that the value of this product is fully twenty-five dollars United States currency per pound. However that may be, I find that the distillation, and in fact the whole business, is in the hands of a very few, and that certain technical knowledge is essential to produce the best results. Since the American occupation several Americans have entered into the enterprise, and as the trees are prolific in the production of flowers, I presume that a larger production of the oil, with more scientific methods than those hitherto employed, will in the course of time increase the supply and correspondingly decrease the value of the product.

The following statistics from the annual report of the collector of customs of the Philippine Islands give some idea of the amount of oil produced, to what countries exported, value in United States currency, etc.:

Exports of Ylang-ylang, 1902 and 1903.

	1902.	1903.
To France	$63,279	$101,566
" United States	11,243	9,621
" England	800	2,880
" all other countries	9,283	9,125
Total	$84,596	$123,192

Of this amount $122,721 worth was exported from Manila and $471 worth from Cebú.

In the distillation of the cananga flower, at first the most volatile ethereal elements containing oxygen pass over, and these contain the odoriferous particles, while with a higher temperature the minor and less desirable products, such as the sesquiterpenes, pass into the receiver. On the island of Luzon and in Java the first product or best oil is known as the oil of ylang-ylang, while the later product (or when it is inseparable from the first) is known as cananga oil. The gathering, selection, and distillation of the flowers, on account of the volatility of the odoriferous particles, requires considerable care and technical knowledge. Very few distillers are able to produce an excellent oil of equal consistence and value. Although ylang-ylang oil is the product of low-temperature distillation, thus containing the ethereal products, while in cananga oil the sesquiterpenes predominate, the difference between them is said to be rather quantitative than qualitative.

The first analyses were made in 1873, by Gal, who found benzoic acid in the oil, thus showing that benzoic acid is present in an ethereal state. Reychler, who made more thorough analyses of the ylang-ylang and cananga oil, found also present in the same state acetic acid. Of alcoholic constituents, which are probably united with the acids, there have been found linalool and geraniol, which have been isolated. The oil is insoluble in water, partially so in alcohol, and entirely so in ether. The characteristic odor of the oil is somewhat dependent on the presence of the methyl ether of paracresol, as also cadinin and pinene. There are also present phenols and sesquiterpene hydrates. In addition to these bodies there is present a very small quantity of something resembling bisulfids, but whose chemical nature is not yet determined. The violet color reaction which the oil gives with iron chlorid is due to traces of phenols, whose isolation would require large quantities of this expensive oil.

The oil sent out from Manila, in the neighborhood of which city the trees are cultivated with a view to producing the best oil, is of light yellowish color and of extraordinary pleasant odor, with a specific gravity of 0.930 to 0.950. As

the odor depends largely on the presence of the ethers, the saponification number in a good oil should range from 75 to 120. Treated with iron chlorid the alcoholic solution should give a violet reaction. Ylang-ylang oil coming from other places than Manila varies considerably; some of that examined by Gal came from the West Indies and indicated a specific gravity of 0.980, while oil from Réunion indicated 0.974.

By reason of the value of the product, many attempts at adulteration are resorted to. Used for this purpose is cocoanut oil, which is readily detected by various chemical analyses showing negative results, and also by the simple method of refrigeration with salt and ice, when the product so adulterated assumes a "buttery" consistence.

The discovery, on my part, of the possible value of ylang-ylang as a dental remedy was entirely accidental. A German came to my office, on a Tuesday, to have me attend to two teeth which were paining him. On examination I found the pulps nearly exposed, and, with a view of saving them, after removal of the caries, I applied the usual treatment, and desired to make an appointment for the following Friday. In answer to this request I received the startling reply that it was not necessary for him to come on Friday—"as on that day his teeth would not ache." This statement aroused my curiosity, and I wanted to know how he could tell on Tuesday that the teeth would not ache on Friday. He simply stated that on Mondays, Wednesdays, and Fridays he drew off the ylang-ylang, and that then his teeth would not trouble him. Further inquiry showed that he was employed in an ylang-ylang distillery, and was a specialist in the work; and that on the three days mentioned, by reason of his inhalation of ylang-ylang in drawing it off with a pipette, he inhaled sufficient of the ethereal products to prevent pain, notwithstanding the fact that the cavities were filled with débris. I secured some of the oil from him, and commenced to experiment with it.

It is a source of regret to me that sufficient facilities do not as yet exist in this city for me to test the germicidal and antiseptic properties of this oil. It being considered merely as a perfume, no examination of this kind has ever been made; and one of the objects aimed at in the writing of this paper is to have someone take up the matter and ascertain just to what extent the oil possesses these properties.

In my practice the oil has replaced such remedies as the oil of cassia, cinnamon, gaultheria, thyme, and almost creasote and carbolic acid. From practical tests, it seems to me that there is no essential oil which I have been in the habit of using to which the oil of ylang-ylang is not superior in medical virtue as well as in agreeable and satisfactory effect upon the patient. I have kept it sealed in a putrescent pulp-canal for a period of six months—to find it upon removal as odoriferous as when introduced. There apparently seems no end to its persistence.

I trust that someone with the proper facilities at hand will investigate and report upon the theoretical phase of the value of this drug—for I feel that I may now so term it. The cities of Paris and Berlin, whither the bulk of the oil is exported, should be favorable fields for this purpose.

LITERATURE.

1. J. CHAS. SAWER, F.L.S., "Odontographia." London, 1892.

2. VON E. GILDEMEISTER u. FR. HOFFMANN, "Die Aetherischen Oele." Berlin, 1899.

3. "Report of the Collector of Customs for the Philippine Islands, 1903."

IS DENTITION AN ETIOLOGICAL FACTOR?

By WM. J. MANNING, M.D., D.D.S., Washington, D. C.

THE place of dentition as an etiological factor in the diseases of infancy is one which has given rise to much discussion in both professions. From a very early period the view has come down to us that many of the diseases and conditions seen in children at that age (between the ages of six months to two years and over) were to be traced to "teething." The list is indeed a long one, but, as time goes on, one disease after the other is withdrawn from the category, until at the present time, among the laity only, with a limited number of physicians, are obscure symptoms laid at the door of dentition.

Some physiologists claim that the growth and eruption of teeth cause no more pathological conditions than the growth of the finger-nails or the hair; *secundum naturam* seems to be their motto. Why, they ask, should nature cause this train of pathological sequelæ? —you do not find them following the growth of the various other organs after birth. The mistake is made, they claim, that physicians overlook the fact of disease of the kidneys, brain, intestines, or stomach because it happens to be about the period of the eruption of teeth. He quiets the mother and himself by the remark that the child is "only teething."

Be all this as it may, no one can deny the fact, if he has made observations, that reflex symptoms of most alarming nature are produced during dentition. While probably one-half of all children cut their teeth without any objective symptoms whatever, the remaining half show symptoms that cannot be denied. There will be disturbed sleep, the child is fretful, and the appetite is impaired. In the majority of cases there is increased salivation, with sharp cries, and the child shows a disposition to stuff the fingers into the mouth. There may be constipation, but as a rule there is diarrhea. The thermometer will show, in some cases, a temperature of 103° F. or even higher, and it may remain stationary or drop a degree or two. This may continue for weeks.

In rhachitic children all these symptoms may be intensified. When convulsions occur they may be traced to forced or over-feeding, and hardly ever is it due to dentition *per se*. With some of these cases a rash may accompany the period of dentition with each group of teeth.

The child should be watched carefully and examinations made frequently to be sure that some other grave condition does not exist. In the great majority of cases in which the symptoms just described are noticed, they are due to some other factor than dentition. When, however, these symptoms all subside on the emergence of the tooth or teeth, and when they are repeated in the same child as each group of teeth becomes involved—together, in each case, with indurated, swollen gums —we may conclude that dentition has been a factor in some degree.

Too much, however, cannot be said against the widespread belief among the laity that diarrhea accompanying dentition is normal or beneficial, and "will do the child good." It is to be noticed that diarrhea does not accompany dentition in cold weather, and this seems to be the best argument against its importance as an etiological factor.

It is to be remembered that infants at this age are peculiarly susceptible to any derangement of the digestive tract, and severe cases of diarrhea can be brought on by overfeeding. Especially is this so in the case of bottle-fed infants, where overfeeding is the rule. As attacks of bronchitis and nasal catarrh are readily

induced at or about the period of dentition, exposure should be guarded against. Otitis media may exist in a great number of these cases when it is least expected. Acute otitis is secondary, as a rule, to catarrhal or infectious lesions in the rhino-pharynx, and with exposure otitis may complicate the conditions and the intense suffering therefrom be credited to dentition.

The nervous symptoms may be relieved by small doses of phenacetin and the bromids better than by any form of opium.

Drugs, as a rule, enter but little into the treatment of this condition. All the thousand-and-one devices for making dentition easy are a delusion. Probably the hot pack to induce sleep, together with a small piece of ice wrapped in the end of a napkin, which is given the child to suck, and the application of iodin tincture to the gums, form the most practical methods of treatment for this condition. Lancing the gums is, in a great many cases, little more than scarification, and brings relief the same as any local bloodletting will do in the various degrees of acute and chronic inflammation. To be of service to the erupting tooth or teeth the incision should be deep and made through that part of the tissue where the greatest tension is observed. The point of the bistoury should be reintroduced and semicircular sweeps made to free the presenting part of tooth from the integument. It will be found best to have a nurse, if one be present, hold the child rather than the mother, for obvious reasons. Care must of course be exercised as to this procedure being the means of conveying infection.

The formation of mental conceptions at the age of dentition being *nil*, one must almost believe that the suffering is not so intense as the grown person would imagine. Judgment and inference are the most complex products of the intellect. Since conception, perception, memory, ideation, and the association of ideas are the necessary preconditions of judgment and reasoning, they will be more or less affected by every imperfection of these processes. In other words, Does the child at that age suffer pain without knowing what pain is? I have noticed that in operations on the very young for hare-lip, in which no anesthetic was given, the child's cry has been one of annoyance rather than of pain.

INTERNATIONAL CHARACTER OF THE EARLY DEVELOPMENT OF DENTISTRY IN AMERICA.

By CHARLES McMANUS, D.D.S., Hartford, Conn.

(Read before Section IX, Fourth International Dental Congress, St. Louis, Mo., August 30, 1904.)

IN the few moments at my disposal I desire to touch briefly upon one small feature connected with the early history of our calling in this country. As it concerns a matter of applied sentiment rather than applied science, it seems peculiarly appropriate that we consider it at such a time as this.

The great exposition of which this congress forms a part is not only to display the latest modern achievements of art and science, but to commemorate the great deeds of the past and the men who accomplished them. This proper sentiment is shown most beautifully, in our own case, in the medal struck in honor of this occasion—upon one side of which are inscribed the names of men representing the various nations who have contributed to the upbuilding of the den-

tal profession, while upon the other side it reminds us that we are not only in the city of St. Louis, but are under the patronage of that most distressful lady, St. Apollonia—who seems after all these many many centuries, thanks largely to the gallantry of Professor Peirce, to have come into her own again.

This union of sanctity and science today was many years ago foreshadowed, in a small way in the person of that accomplished gentleman the Reverend Doctor Solyman Brown, A.M., M.D., D.D., D.D.S., who was not only a dentist but a minister, and could claim in every sense to be a "man of letters."

But, seriously speaking, this international professional spirit of which we have heard so much lately has always been a factor in the development of our profession in this country. There has been a germ of "internationalism in dentistry" from the very beginning of practice in America. As early as 1735 various itinerant Englishmen began to ply their art in a small way, and by 1766 arrived a regularly educated practitioner, Mr. Robert Woofendale, a pupil of the King's dentist, Thomas Berdmore. Two years later John Baker, another Englishman, practiced in Boston, New York, and other towns. About this time several Americans became interested in the subject, notably Isaac Greenwood and Paul Revere in Boston. Later still we find a certain Whitelock or Whitlock, who is kindly spoken of by Dr. Hayden as "a gentleman of polite address and accomplished manners." He is said to have come to this country as one of a company of actors from London; but we must not think any the less of him for that, for if he gave up acting for dentistry, the great French tragedian Talma, the son of a distinguished dentist, forsook dentistry for the stage.

JOSEPH JEAN FRANÇOIS LEMAIRE AND JAMES GARDETTE.

But, whatever place we may be willing to give these early Englishmen, we can safely say that dental science was brought to America by two patriotic young Frenchmen, toward the close of the Revolutionary war. The first, Joseph Jean François Lemaire, arrived July 12, 1780, as a surgeon of volunteers with the French troops under Rochambeau. Lemaire had studied at the medical school in Paris, giving particular attention to the dental art. The second, James Gardette, was a naval surgeon who had pursued his studies of anatomy and surgery in the Royal Medical School of Paris, afterward removing to the hospitals at Toulon and Bayonne, where he obtained his commission. He had received instruction in dentistry as part of his training as naval surgeon, from M. LeRoy de la Faudignère, a dentist of Paris then in high repute, and had provided himself with the best works extant and with a limited set of dental instruments. He arrived on a warship at Plymouth, Mass., in January 1778.

During the winter of 1781-82, the revolution being then nearly over, the French and American armies were in winter quarters near Providence, R. I., and we find in intimate friendship these two young Frenchmen, and with them a youth of eighteen, Josiah Flagg, destined to be the first native-born American dentist.

"So," Dr. Wm. H. Trueman says, "it needs but little stretch of the imagination to locate the first school for dental instruction in the United States and the first dental meeting for mutual improvement around this revolutionary campfire."

Lemaire afterward practiced in New York, Philadelphia, and Baltimore, returning to Paris in 1787, where for many years he continued as a skilful dentist and ready writer.

Gardette having practiced first in Newport, R. I., went to New York, and finally settled in Philadelphia, where he remained for forty-five years, returning to his native land in 1829. He did much in his long and honorable career to make dentistry in Philadelphia what it is today.

Josiah Flagg, their pupil, located in Boston in 1783, where he practiced with success until 1812, when his patriotism again got the better of him and he enlisted in the navy, and was captured and

taken to England. While on parole he practiced dentistry in London in 1813-15, making the acquaintance of the celebrated surgeon Sir Astley Cooper, frequently attending his lectures and clinics at Guy's Hospital.

In 1803 there came to Philadelphia an Irishman, Edward Hudson, educated at Trinity College, Dublin, and the pupil of his cousin, a talented dentist of that city. Hudson was a remarkable man, a dentist of great skill, and for more than thirty years he occupied a commanding position among the reputable dentists of this country. Dr. Elisha Townsend said of him, "All who knew him intimately, respected and prized him for the exceeding goodness and sincerity which shone so brightly conspicuous in his character. By his patients he was idolized as few of his professional brethren can ever expect to be."

In 1807, at the age of twenty-two, Leonard Koecker, a native of Bremen, Germany, bravely began practice in Baltimore. The chance meeting years before with a kind-hearted traveling Hebrew dentist in Hanover, who had given him some slight instruction and a small outfit of instruments, was the starting-point in the career of this eminent dentist. He went to Philadelphia about 1812, and was very successful, as his practice brought him $8000 in one year, until ill health compelled him to seek rest in Europe in 1822. Upon his arrival in London he decided to locate there. As he carried with him a number of influential letters of introduction he was very successful.

A Frenchman from Paris, A. A. Plantou, introduced porcelain teeth into this country in 1817.

As early as 1817, Dr. Hayden had broached the idea of a national convention of dentists, but as he says, "the pear was not ripe." From time to time he renewed his attempts only to fail. But about 1833 two French empirics, "the Crawcours," arrived in New York with a flourish of trumpets and their "mineral paste," and unwittingly, by their unprofessional conduct, had a good deal to do with forcing the reputable dentists of the day to make their calling a true profession. In the crusade against these men the profession had descried some of the advantages resulting from associated effort. They already had a journal started in June 1839, and a college, a charter for which was granted in the same year. They were now to have a national association.

THE FIRST DENTAL JOURNAL.

Let us consider the journal first. The publishing committee sent a specimen number to every dentist whose name and residence they could obtain in the United States and British provinces of North America. They stated that they had "the promise of assistance from the pens of some of our most talented brethren in England." They announced that "The first dental surgeons of Europe, among whom we are proud to mention the names of Cartwright, Koecker, and Brewster, have in letters written in the kindest and most friendly manner, expressed their high satisfaction at the efforts we are making to advance, not only in this country, but also in Europe, the interests of the dental art; and no inconsiderable portion of our subscribers are of the most distinguished cities of Great Britain."

Associated with the editors, as collaborators and *ex officio* agents, were Leonard Koecker, M.D.Lond., C. Starr Brewster of Paris, S. Highley of London, and E. Gidney of Manchester, England. Among the early subscribers to the journal outside of this country were twenty-two in England, four in Scotland, two in France, one in Holland, and one each in the West Indies and New Brunswick —nearly ten per cent. of the entire subscription list.

The publication committee also acknowledged with satisfaction the good fortune of receiving from Mr. Eleazer Gidney, dentist, recently from Manchester, Eng., the loan of his dental library, consisting of books and prints collected in France and England with much labor and expense. It was very complete and large for the time—over one hundred volumes—and what became of it heaven only knows, but we can join with the

committee in thanking Mr. Gidney in behalf of the profession generally for his liberal encouragement of the efforts to establish an *American Journal of Dental Science.*

THE FIRST NATIONAL DENTAL SOCIETY.

On August 18, 1840, Dr. Horace H. Hayden expressed his desire to make a few remarks before submitting the constitution of the "American Society of Dental Surgeons" to the consideration of the meeting.

He said: "At the present period renewed efforts are making in England, France, and Scotland to place our profession on still higher ground than it has yet attained; and shall we, of these United States of America, remain inactive in this grand endeavor?"

And in the first article of the preamble of the objects of the society, we read: "The objects of this society are to promote union and harmony among all respectable and well-informed dental surgeons; to advance the science by free communication and interchange of sentiments, either written or verbal, between members of the society, both in this and other countries.

The society on August 20, 1840, proceeded to elect honorary members as follows: Samuel Cartwright, London; Robert Nasmyth, Edinburgh; Alexander Nasmyth, London; C. Starr Brewster, Paris; John T. Edmonds, London; James McPherson, Glasgow, Scotland; A. G. Becht, The Hague, Netherlands; Leonard Koecker, London; Thomas Bell, London; C. F. Delabarre, Paris; David Wemyss Jobson, Edinburgh; E. Gidney, Manchester; Joseph Lemaire, Paris.

Lemaire at the time of his election had been deceased about six years. He died in 1834.

In a statement entitled "Information Concerning the American Society of Dental Surgeons," published in the *American Journal of Dental Science,* vol. i, No. vii, Dr. Solyman Brown says: "Among the primary objects kept steadily in view by the projector of this society and his professional coadjutors, may be alleged—first, THE PUBLIC GOOD, resulting from the united efforts of the most distinguished and enterprising dental practitioners in the United States, aided by those of other countries, in settling the best methods of practice in all forms of dental disease."

We have not time to consider further this first national association. It was started on a broad basis, "under the most flattering auspices and with a membership never since surpassed in this country in high professional ability and private reputation, but, through a mistaken course of conduct, obstinately persisted in, it defeated its high objects, and after sixteen years worked its own ruin."

In this brief and hurried way I have endeavored to show that a hundred years ago Englishmen, Frenchmen, Germans, and Irishmen, many of them for their time regularly educated dentists, came to this country and helped lay the foundation for a profession. That over sixty years ago the dentists of a number of the countries of Europe were asked to and did assist in the formation of the first dental journal and dental society. That in the early days many of our best men practiced successfully in other countries—notably Flagg, Koecker, Eleazar Parmly, with others in England; Brewster in France and Russia; the Spooners in Canada.

The history of the pioneers will show that they were honored and respected both professionally and socially. It is true they were comparatively few in numbers, and after a time, particularly about 1833 to 1838, the irregular practitioners who deserved and got little respect increased very rapidly; but we should judge a profession as we would an army, by its advance guard, not by its camp-followers.

I feel that the idea is too generally held by that public—which we sometimes talk about educating—and by some practitioners, that prior to about sixty-five years ago dentists had little or no standing in the community, and that largely because dentistry had laboriously worked itself up from the tinker, the barber, and the blacksmith. Now this is a very pretty little tripod which it seems almost

a pity to try to upset. Much can be said with truth about these occupations.

The *tinker*—that primitive trade—the lowest of all the crafts; and yet it has for its own, John Bunyan!

The *barber*—the harmless necessary barber; what an unkempt lot of barbarians we should be without him! Why, one of the sweetest poets France ever produced was a barber. His country honored and his government decorated him, and he wasn't ashamed of his calling.

The *blacksmith*—the village blacksmith—who "looks the whole world in the face, for he owes not any man."

It would ill become us to mock with a disdainful smile their useful toil. They merit our respect and our patronage—when we need them—but they had nothing to do with the evolution of dental surgery.

Why, a profession that can look back two centuries and claim as its father the eminent French dental surgeon Pierre Fauchard, and look back two more centuries and justly point to the great French surgeon Ambroise Paré as its foster-father, and which even in this young country has had such an interesting development—the early international character of which I have tried, I am afraid very imperfectly, to show you—why it should seem to search the highways and byways after alleged progenitors, is to me one of the many curiosities of dental literature.

THE SOLVENT ACTION OF SALIVA ON CEMENTS.

By J. E. HINKINS, D.D.S., Chicago, Ill.

(Read before Section IV, Fourth International Dental Congress, St. Louis, Mo., August 31, 1904.)

IN a paper read before the International Dental Congress in Paris, in August 1900, the first report of a series of researches on the cause of the disintegration of cement fillings was presented. In that communication (see DENTAL COSMOS, June 1901) the speaker, in conjunction with Dr. S. F. Acree, pointed out the rôle that bacterial decompositions of the foodstuffs, with attendant production of acids, must play in the failure of cement fillings. It was found that certain bacteria generally present in the mouth, such as the bacillus coli communis, the staphylococcus pyogenes aureus, the sarcina lutea and others, decompose foodstuffs and generate organic acids.

Not only was the nature of these acids determined, but also the amount; it was found in addition that they were formed in sufficient quantity to dissolve readily several of the zinc phosphate cements which are daily used by dentists all over the world. Such cements as those of Ames, Justi, and Weston, and Harvard cement, were not able to withstand the solvent action of the organic acids produced by these common mouth bacteria. By actual experiment it was demonstrated that a sample of Justi cement in finely powdered condition was dissolved to the extent of 12 per cent. of its weight when treated for forty-eight hours with one of the above acid solutions. A sample of Ames' cement lost 16 per cent. in forty-eight hours, and a sample of Weston's cement lost 6 per cent. in seventeen hours. Of course, a sample of solid cement, such as a cement filling in the tooth, would have only a small amount of surface exposed, and this solvent action by acids would be decreased manyfold.

In the failure of cement fillings, and also of the tooth-structure, there are two very important factors. First, the mechanical grinding away, due to friction, as in chewing foodstuffs. Second, the solvent action of the acid saliva. That

the second cause is very often the more important is evidenced in many cases by the more rapid disappearance of the cement filling and of the tooth under the margin of the gum, and in other small pockets or cavities where foodstuffs and bacteria can collect. In such pockets the bacteria generate organic acids, which not being easily washed out by the saliva become more and more concentrated, and consequently dissolve away the cement filling and the tooth far more readily.

We believe that the formation of cavities in general is due to this same cause. As is well known, cavities in teeth are generally formed in places which are comparatively inaccessible to ordinary methods of cleansing. Foodstuffs and bacteria collect at such places, and the process of dissolving out the cement begins. As the cavity becomes deeper it becomes more and more difficult to remove the cause of the trouble, and consequently the cavity spreads. The only remedy, then, is to remove all the infected portion and build up the tooth to its original contour by means of some filling material.

The following table gives the amount of acids formed by the above bacteria in various solutions of foodstuffs, the time required and the medium also being added:

Bacillus.	Solution (5 cc. used.)	Time.	Strength in N/10 alkali.
1. Bac. acid. lact.	Peptone	10 days	1.70 cc.
2. Staph. pyog. aur.	"	9 "	1.30 "
3. Sarcin. lutea	"	9 "	1.75 "
4. Sarcin. aur.	"	8 "	1.60 "
5. Bac. coli com.	"	8 "	1.70 "
6. Bac. acid. lact.	"	20 "	6.40 "
7. Sarcin. lutea	"	16 "	3.00 "
8. Bac. acid. lact.	Asparagin	7 "	1.75 "

The amount of acid generated in the above solutions is comparatively small. If reckoned as acetic acid the solutions would contain on an average about $\frac{1}{5}$ of one per cent. acid. It might seem that such a very weak acid solution could not dissolve the cements or the tooth-structure to any appreciable extent, but we must remember that these acids are always present in the mouth, being constantly replenished by the flow of the saliva. Even though the acidity be small, it is yet found to be strong enough to dissolve our ordinary cements.

The above outline is about the extent of the research work that was presented to you in the first paper. A continuation of our original investigations has now shown that there are other very important factors in the failure of cement fillings and of tooth-structure. Indeed, some of these may be even more important than the bacterial decompositions. As the most important of these we wish to bring to your attention the action of enzymes and enzyme-like bodies.

ACTION OF ENZYMES AND ENZYME-LIKE BODIES.

There are many cases of failure of cement fillings and of tooth-structure in which bacterial decompositions can play only a minor rôle. You have all, without doubt, had many cases under your personal observation in which erosion of the tooth-structure and of cement, amalgam, and gold fillings—and even of ivory artificial teeth—has been very marked. Such cases generally occur in persons past middle life, and who take excellent care of their teeth. This erosion may manifest itself in some cases only at the margin of the gum, but in other instances the erosion may extend over nearly the entire tooth-surface. Furthermore, these changes are not limited to the anterior teeth, but extend to the bicuspids and molars.

These erosions we now believe to be due to the solvent action of the secretions of the mucous membrane and salivary glands of the mouth, in cases in which from constitutional causes these secretions become especially acid (or alkaline). It is very likely that there are certain lines of flow of the saliva in the mouth—channels through which the saliva flows most easily after excretion and during its movement in the mouth—and the erosion will naturally be more marked on teeth situated in such places. We believe that the activity of the various enzymes present in the body is most

intimately connected with the character of all the secretions and excretions.

When we consider the saliva, the pancreatic juice, and the other secretions of the body, we find that each contains certain enzymes or ferments. The saliva contains ptyalin and glucase. Heretofore the ptyalin has been thought to accomplish simply the liquefaction of the starch—a conversion of the starch into dextrin, and finally, with the aid of the glucase, into glucose. The secretion of the stomach contains pepsin and rennin. The pancreatic juice contains pancreatin, steapsin, and trypsin. Each one of these enzymes plays a very important part in the decomposition of foodstuffs into simpler products that can be taken up by the blood and carried to different parts of the body, there to undergo other reactions and combinations into products that then make up the component parts of our systems.

The chief products of these enzymotic decompositions of fats and albumins are *organic acids.* Among these (Hammerstein, 1899, p. 135, etc.) must be mentioned uric acid, leucin, xanthin, caffein, lactic acid, asparaginic acid, carbolic acid, phenyl-propionic acid, paracresol, phenyl-acetic acid, volatile fatty acids, and many amido acids. These acids constitute a great part of the digested food that is thrown into the blood, to be carried over the whole body, and many of them have been isolated from the blood. Further investigations will doubtless reveal the presence of many other similar acids. The great difficulty in studying such decompositions of albuminous substances—the difficulty of isolating and identifying the individual constituents—has been clearly emphasized by Emile Fischer, the savant who stands alone in the study of peptone and albuminous substances.

The saliva receives its share of these acids even under normal conditions. It has been shown (Hammerstein, 1899, p. 252, etc.) that nuclein, leucin, xanthin, and many volatile fatty acids, together with acid phosphates and bicarbonates, are present in small amount in normal saliva. The amounts of these organic acids probably vary with change of health and change in age, and certainly vary greatly among individuals. When we consider that in abnormal constitutional conditions this amount may be greatly increased, it is not surprising that such erosions are more marked in some individuals than in others.

So far as examined, it has been proved by actual experiments that the acidity of the saliva of individuals with marked erosion of the teeth is much greater than that of individuals not so affected.

History of Cases under Investigation.

	Acidity (of 10 cc. in cc. N/10 KOH).
1. Saliva of Dr. F. (42 yrs.), no erosion	0.34
2. Saliva of Dr. A. (28 yrs.), slight erosion	0.70
3. Saliva of Mrs. H. (52 yrs.), decided erosion 12 yrs.	1.32
4. Saliva of Dr. H. (46 yrs.), decided erosion 2 yrs.	1.40
5. Saliva of Mr. G. (62 yrs.), very decided erosion 3 yrs., now extending from molar to molar	1.94

The rôle of the ptyalin in the generation of these organic acids must be very important. When we consider that we have a large number of acid derivatives —substances that by hydrolysis can give rise to acids—in the saliva, and when we remember that these can be hydrolyzed by the enzymes, we see at once the possibility of having the saliva become acid. When from *constitutional causes* the enzymes become specially active and generate larger quantities of acid than usual, if there are present no counteracting influences tending to neutralize this acidity, we must expect not only the saliva to become specially acid, but also many other secretions of our systems. This would doubtless account for the excess of uric acid, of xanthin bodies, and others that give rise to gout, rheumatism, and other ailments.

Up to within the last few years not much was done to clear up the nature of these enzymes and the course of the chemical reactions which they are able to bring about. The very nature of the enzymes themselves and the difficulty of

obtaining them pure was the most serious hindrance to the exact study of their properties. These enzymes are organic compounds themselves, not very stable toward heat, acids, and other influences, and for a long time the only experiments with them were really only qualitative experiments with the impure substances. There was consequently much doubt about the real action of these enzymes in the system. We were certain that the enzymes and other agents together produced certain chemical changes that constitute the metabolism of foodstuffs in our systems. But until we could separate these various agencies and show the exact part played by each, we could not be certain that the enzymes play certain rôles. These doubts are being rapidly removed. A large number of enzymes, such as ptyalin, diastase, pancreatin, emulsin, maltase, and many others, some of which are very important agencies in our digestive processes, have been prepared in comparatively a pure state, and are being studied carefully. Especially are the chemical reactions which these enzymes are able to induce being studied exactly—quantitatively. A short *résumé* of some of the more important parts of the work would not be without interest.

As is well known, the yeast plant, *Saccharomyces cerevisiæ*, converts glucose into alcohol and carbon dioxid. It was thought by many that in this chemical process the yeast plant used the glucose for food, and that the alcohol and carbon dioxid were waste products from the plant. Buchner (*Ber. d. deutsch. Chem.-Ges.*, 30 u. 31 Buchner u. Rapp, *ibid.*, 31), however, showed that when a quantity of yeast is ground up so that the cell walls are crushed, and the mixture is filtered through a filter made of porous porcelain so that no yeast cells can pass, this liquid filtrate, which he called zymase, still has the power to change glucose into alcohol and carbon dioxid. The activity of this zymase is not destroyed or diminished by small amounts of chloroform, sodium arsenite, or glycerin, whereas the functions of the yeast itself are hindered or completely stopped by these reagents. Here we have chemical changes wrought by organic compounds, enzymes, the activity of which is not dependent upon the life of the plant with which this enzyme was associated. Just as in our living body the ptyalin, pancreatin, and other enzymes carry on their functions, so in the yeast plant the zymase effects the fermentation of glucose into alcohol and carbon dioxid entirely independent of the life-process of the yeast plant itself.

We have known for some time that in the pancreatic juice there are probably one or more fat-splitting enzymes. Whether this action is due to the pancreatin or to the steapsin, or to both of these in connection with other agencies, was not certain. Recently, Kastle (*American Chemical Journal*, xxiv, p. 491) and Loevenhardt have shown that the pancreas extract—lipase—not only can hydrolyze fats into stearic acid and glycerin, but can also decompose much simpler esters—the ethyl ether of butyric acid, for instance, into butyric acid and ethyl alcohol.

The writer and Dr. S. F. Acree (*American Chemical Journal*, xxviii, p. 370) have shown that pancreatin can hydrolyze a triacetyl-glucose-peptone solution into glucose and acetic acid, and the exact amounts of acetic acid formed in varying times were quantitatively measured.

It has been proved, therefore, by these experiments that the pancreatin can exert its normal function on foodstuffs outside of the body, and independently of other life-functions of the body.

In a recent study of the actions of enzymes on certain foodstuffs, the essayist (*American Chemical Journal*, xxviii, p. 370) in conjunction with Dr. S. F. Acree has gone into still other problems in connection with the enzymes. Not only have we investigated the activities of a number of pure enzymes and measured quantitatively the amounts of acids which these enzymes can produce, but we have also investigated the following very important problem:

In considering the varied foodstuffs in their course through the digestive process, it has heretofore always been as-

sumed that each particular kind of foodstuff—fat, starch, albumin—is acted on by only one particular enzyme; for example, the ptyalin acts upon the starch, the pepsin upon albumin, etc. On the other hand, we suspected that there may be some classes of foodstuffs which will be acted upon by every enzyme in the digestive system—by some to a large extent, of course, and by others not so much. To test this hypothesis we subjected triacetyl glucose to the action of a large number of enzymes. Among this number were ptyalin, pepsin, pancreatin, and emulsin, all enzymes occurring in our bodies. Every enzyme examined was able to hydrolyze triacetyl glucose into acetic acid and glucose. Pancreatin and ptyalin were very active, while others like emulsin and diastase were not so active. So we feel safe in assuming that while each ferment in the body has certain functions which it can best perform, yet it may be concerned in still other reactions in a minor way.

In order to show you the varying activity of different enzymes, we present a short table of the determinations of the acidity produced by different enzymes when acting upon a triacetyl glucose which was at first N/42.50 acid:

Enzyme.	Time.	Strength of acid solution.
Pancreatin	10 days	N/21
Amylopsin	10 "	N/25
Emulsin	11 "	N/40.5
Maltase	14 "	N/22.2
Diastase	12 "	N/33
Takadiastase	7 "	N/27

From the above discussion it is clear that the rôle of the enzymes in our life-processes must be very important. The foods are digested by enzymes, the various organic acids are produced and are taken up by the blood and given out to some extent in the secretions—one of the important ones being the saliva. The saliva has several organic acids in it. When from constitutional causes this acid becomes excessive, the teeth and fillings are far more likely to be dissolved away. In order to establish a definite connection between the activity of the enzymes and the failure of cements, we instituted the following experiments: A neutral peptone solution of triacetyl glucose* was subjected to the action of pancreatin and ptyalin. The acidity increased regularly and was measured from time to time, as the following tables indicate:

Ptyalin Solution.

Time.	N/10 KOH required for 10 cc. solution.	N/10 KOH required for original triacetyl glucose solution.
0 days	0.00 cc.	2.50 cc.
5 "	7.50 "	3.00 "
9 "	8.50 "	3.50 "
17 "	11.00 "	4.00 "
26 "	13.00 "	4.60 "
32 "	13.90 "	4.75 "
(Enzyme filtered out.)		
40 days	13.75 cc.	5.50 cc.
47 "	13.75 "	5.60 "

Pancreatin Solution.

Time.	N/10 KOH required for 10 cc. solution.	N/10 KOH required for triacetyl glucose solution.
0 days	0.00 cc.	2.50 cc.
5 "	8.00 "	3.00 "
9 "	9.00 "	3.50 "
17 "	12.00 "	4.00 "
26 "	14.50 "	4.60 "
32 "	14.84 "	4.75 "
(Enzyme filtered out.)		
40 days	14.75 cc.	5.50 cc.
47 "	14.50 "	5.60 "

These solutions were filtered from the enzyme, and they then much resembled bacteria-free saliva in composition, differing only in being a little more acid. To ascertain whether these solutions could dissolve cement fillings, we treated samples of the solutions with pellets of cement which had been made as usual for fillings and had set, and with the finely-powdered cement obtained by grinding

* Glucose 40 gm. and acetic anhydrid 120 gm. were heated on a water-bath for half an hour, to dissolve the glucose. The solution was then poured into 250 cc. of hot water, evaporated to about one-third of its volume in three hours, neutralized with N/KOH solution, and diluted to 1 liter. Then 250 cc. of this solution + 50 cc. of 1 per cent. bouillon, were treated with 5 gm. of ptyalin or pancreatin. The solutions were kept in an ice-box, and a check was also kept on the original triacetyl glucose solution.

up some of the pellets. The solutions were allowed to stand several days in an ice-box, and the loss in weight of the cement was then determined. The following tables show the quantitative data:

Ptyalin Solution.

Time.	Ptyalin solution.	Weight of cement.	Loss.
0 days	50 cc.	0.6793 gm. (pellet)	
8 "	50 "	0.6505 " "	
			0.0288 gm.
0 "	50 "	1.000 gm. (powd.)	
8 "	50 "	0.927 " "	
			0.0730 "

Pancreatin Solution.

Time.	Pancreatin solution.	Weight of cement.	Loss.
0 days	50 cc.	0.5767 gm. (pellet)	
8 "	50 "	0.5400 " "	
			0.0367 gm.
0 "	50 "	1.000 gm. (powd.)	
8 "	50 "	0.860 " "	
			0.140 "

It is very evident from the above tables that our solutions made acid by enzymes can readily dissolve the cement. It is to be noted that the solid pellet dissolved much more slowly than the powdered cement, due to the much smaller surface exposed. The erosion of the pellet would approach more nearly that of the filling *in situ*. As seen above, the acidity of very acid salivas is very much smaller than that of these two enzyme solutions, and consequently the cement fillings in the teeth would be eroded more slowly. But the difference would be one of degree only. We wish especially to call your attention to the fact that the above tables show decisively that the more acid solution dissolves the cement more rapidly.

In order to learn the combined effect of bacteria and enzymes together on a foodstuff solution like peptone-triacetyl-glucose solution, we tested each of the foregoing pancreatin and ptyalin solutions with cultures of bacteria taken from the mouths of individuals presenting severe cases of erosion. Since in the mouth there are generally present enzymes and bacteria together, such conditions are most nearly realized in these solutions. The solutions were kept at 37° C., *i.e.* the body temperature, and titrated from time to time.

It will be seen from the tables following that even in a shorter time the presence of the bacteria causes a rise in acidity:

Ptyalin-bouillon-triacetyl-glucose Solution at 37°.

Time.	Acidity of 10 cc. expressed in N/10 KOH.
6 days	9.50 cc. N/10 KOH
14 "	12.00 " " "
21 "	13.75 " " "

Pancreatin-bouillon-triacetyl-glucose Solution at 37°.

Time.	Acidity of 10 cc. expressed in N/10 KOH.
6 days	11.25 cc. N/10 KOH
14 "	16.50 " " "
21 "	19.00 " " "

After these two solutions had been standing fourteen days, 50 cc. of each solution was allowed to act upon a pellet and on powdered cement for one week. The following tables will show the amount of cement dissolved. It is to be noted that the powdered cement was much more readily dissolved than the pellet. Again it must be noted that since these solutions are more acid than the saliva, and since the cements are more exposed to the action of the acid, the amount dissolved is many-fold what it would be in a cement filling. The difference, however, is one of degree only:

Ptyalin-bacteria Solution.

Time.	Solution.	Weight of cement.	Loss.
0 days	50 cc.	1.000 gm. (powd.)	
7 "	50 "	0.825 " "	
			0.175 gm.
0 "	50 "	0.2618 gm. (pellet)	
7 "	50 "	0.2255 " "	
			0.0363 "

Pancreatin-bacteria Solution.

Time.	Solution.	Weight of cement.	Loss.
0 days	50 cc.	1.0000 gm. (powd.)	
7 "	50 "	0.7430 " "	
			0.257 gm.
0 "	50 "	0.2608 gm. (pellet)	
7 "	50 "	0.2080 " "	
			0.0528 "

These quantitative data show beyond question that the more acid solution dis-

solves the cement more rapidly. It will be recalled that it was shown four years ago that of those solutions made acid by bacterial decompositions, the more acid solutions dissolve cements more readily than those not so acid.

CONCLUSIONS.

The subject of failure of cement fillings and tooth-structure is the most vital one to the dental profession; for this reason many of our colleagues have given the matter their attention, with the view of learning the causes and conditions attending such failures. The only objection that we find with the papers presented is that the writers have put forward too many hypotheses without verifying them experimentally, while the subject is one that can be cleared up only by a great amount of experimental investigation, keeping in view all the conditions that may exist in the mouth and human system; and we fear that no amount of theoretical speculation or *a priori* reasoning will be of much assistance.

In a paper by Dr. E. C. Kirk (*Items of Interest,* N. Y., July 1902) the theory is discussed that erosions may be due to the action of lactic acid and the acid phosphates of sodium and calcium upon the tooth-structure. We wish to point out that in our paper read in Paris, in 1900, we pointed out the rôle played by these organic acids in the failure of cements and tooth-structure—and in view of this, Dr. Kirk's hypothesis is not new; not only this, but Dr. Kirk did not make reference to our paper on this subject, and therefore failed to give us the credit due.

Dr. Kirk dialyzed saliva and obtained crystals from this liquid which he thought to be lactates or lacto-phosphates. We do not feel that reliable conclusions can be drawn from such data. There are many thousand different substances with the same crystal form. Unless these crystals are isolated and subjected to a chemical analysis—which Dr. Kirk apparently did not make—one can draw no conclusions in regard to their chemical composition. Aside from this, it has been known for some time that calcium acid phosphate is a normal constituent of the saliva, and that lactic acid is formed by bacterial agencies in the mouth. The presence of these lacto-phosphates does not, therefore, prove that they arise from tooth-erosion.

Michaels (Dental Cosmos, 1901, vol. xliii, p. 719) has shown that a dilute solution of potassium sulfocyanid can dissolve away the tooth-structure. This result has also been corroborated recently by Young and Hurst (*Journal of the American Chemical Society,* 1904, p. 885), who have shown that calcium phosphate is dissolved to a small extent by potassium nitrate and by sodium chlorid, with the attendant production of acids. This result of Michaels is very important, because potassium sulfocyanid is an important constituent of the saliva.

Dr. W. D. Miller (Dental Cosmos, March 1904) of Berlin, has recently put forward the mechanical theory of erosion again, and has cited several instances of erosion that have come under his observation. While not doubting the part played by mechanical erosion, to which also we have always called attention, we feel that this is not the chief cause of erosion. If this were so we should expect to find erosion prevalent among all classes who use tooth-brushes, which is not the case. Erosion is most common among people with very acid saliva; and here we wish to point out that Dr. Miller apparently did not determine that the cases under his observation were not caused by this agency.

Many other papers have been read before the dental profession on this subject, but few of them have presented experimental work to verify their hypotheses, and will not be considered here.

From the experimental results presented above we feel that there are two prime causes to be considered in the failure of cement fillings and tooth-structure: First, a loss due to mechanical factors; second, a loss due to the solvent action of the saliva or of acids produced by bacteria. It is believed that in the formation of cavities the bacterial

agencies are the chief ones to be considered. Bacteria and foodstuffs collect in inaccessible places and organic acids are produced. These act upon the cement fillings or tooth-structure and dissolve them out; as the cavity becomes deeper, the destructive agencies become less and less easily removed, and the decay becomes deeper. In order to stop the destruction the cavity must be thoroughly cleaned and freed from bacteria and filled with some filling material, left to the judgment of the operator.

There are still other agencies, however, that must be taken into consideration. In cases of general erosion of the tooth-structure the bacterial agencies cannot be the main feature to be considered. Under these conditions there must be abnormal constitutional causes. We offer the suggestion that under these abnormal conditions there is an increased activity of the digestive agencies—the enzymes, ptyalin, pepsin, pancreatin, emulsin, etc. —with an increase in the amount of acids thrown into the blood. These are transmitted to some extent to the secretions. As a result we find the saliva generally very acid. This acid saliva causes the constant erosion of the cements and tooth-structure. We have shown experimentally that in cases of erosion the saliva is abnormally acid. It has been proved experimentally that these digestive enzymes produce acids in large quantity; and, finally, it has been shown that these acid enzyme solutions resembling the saliva very readily dissolve out the cement fillings. These results connect the various links needed in the chain of evidence, and we feel that the activity of the enzymes is one of the most important factors in the failure of cement fillings and tooth-structure.

THE APPLICATION OF THE CONSTANT GALVANIC CURRENT IN THE TREATMENT OF PATHOLOGICAL CONDITIONS OF THE TEETH.

By Zahn.-Dr. KURT HOFFENDAHL, Berlin, Germany.

(Read before Section II, Fourth International Dental Congress, St. Louis, Mo., August 30, 1904.)

THE application of the constant galvanic current for the sterilization of infected root-canals is not an entire novelty. Mr. F. Zierler, a dentist of Hamburg, published in 1900 a brief report thereon in the *Zahnärztl. Rundschau.* Dr. Brenner, a dental practitioner of Vienna, claimed priority for the method against Zierler. Brenner, however, in his publication entered into no particulars regarding practical details, for the reason that he laid little stress upon the matter, and because he could not conceive the possibility of the general application of electricity in the therapy of roots. The following is a literal quotation from his paper, *Zahnärztl. Rundschau,* ix, No. 416, p. 6797: "For a method to become of general use it must not be too expensive or troublesome, but should be of universal application, while its results must be absolutely certain."

At that period the method failed to appeal to the profession; even a demonstration by Zierler did not succeed in convincing practitioners of the advantages it was possible to derive from the electric current. The subject was dismissed with a few words; and it lay buried during three years.

Last year I began my studies and experiments upon the application of electricity in dentistry independently of the

experiments of Messrs. Zierler and Brenner—and, in fact, for a time without knowledge of their having ever been carried out. I was soon able to convince myself of the antibacterial effect of the constant galvanic current, and arrived at results which greatly exceeded my own expectations as well as those of my associates in our institute.

The tedious and cumbersome method of treating roots heretofore in vogue has been overcome; in from ten to fifteen minutes the electrolytic action of a constant galvanic current of from 1 to 2 milliamperes, itself insensible to the patient, suffices for sterilizing completely root-canals inaccessible to instrumentation; the same treatment also suffices to bring abscesses located in the immediate neighborhood of the apical foramen, and of a size up to ½ cc., to a condition which will eventually lead to an absolute cure. Fistulæ are treated in the same way.

The chemical effects of the electric current upon living tissues consist in its power of inhibiting inflammatory processes, increasing, diminishing, or arresting hemorrhage, dissolving solid neoplasms, aiding absorption, etc.; its vasomotor, trophic, and cataphoric actions also come into play. Of all these properties the electrolytic is of most importance for our purpose. Prof. K. B. Lehmann of Würzburg showed in 1903 that the anode, *i.e.* the positive pole of a constant galvanic battery, if it be made of platinum is capable through electrolysis of depositing chlorin, oxygen, and hydrochloric acid in an alkaline conducting medium, and that these ions with a current strength of 3.5 milliamperes and fifteen minutes' action possess a decided antibacterial effect. The results of such laboratory experiments are readily applicable to dental practice.

I began my experiments upon freshly-extracted putrescent teeth; these with the root-apices were first placed in a bit of ham and subsequently in a glass tube of about the diameter of a tooth, filled with normal salt solution. The free extremity of the bit of meat or of the tube was connected with the negative pole of a constant galvanic battery. A platinum wire was attached to the positive pole; the wire was plunged into the ill-smelling tooth. This arrangement was necessary, as it was desired to liberate chlorin, oxygen, and H_2O_2 in the interior of the tooth. These ions being only freed at the positive pole, while H is liberated at the negative pole, it is obvious that to obtain a result it is indispensable that the anode be placed in the interior of the tooth. The passage of a current of 1.5 milliamperes during a few minutes through the tooth generated a comparatively strong odor of chlorin; the fluid portion in the interior of the tooth was decomposed, accompanied by the production of oxygen, and at the expiration of ten minutes the putrid canal contents had become desiccated and the odor of decomposition entirely disappeared. This experiment was the basis of my further researches.

I made exhaustive studies of currents of the most varied source and strength; I determined that a street current and one from a Leclanché battery are equally to be recommended in practice. Bacteriological researches to be more fully described later showed that the minimum strength of current required for the destruction of bacteria during ten minutes' passage was 0.6 milliampere. Practical experience, on the other hand, demonstrated that a current strength of more than 2 milliamperes may be unpleasant to the patient, especially when remains of vital tissue are still present in the apical region. Accordingly, I usually employ a current of 1.5 milliamperes, and increase it to 2 milliamperes only in the treatment of abscesses other than about the apical foramen, and of pyorrhea alveolaris.

To carry the electrode I first made use of a round rubber holder with a metal-lined funnel attached to its extremity. By this means I sought to unite the platinum wires in a single handle for the simultaneous treatment of all the canals of a multi-rooted tooth. With such an arrangement, however, it could happen that the connection with one or another of the platinum wires might be broken, and the current, notwithstanding that

the circuit remained closed by means of the remaining wires, fail to pass into the canal in question without the operator's knowledge of such failure. I therefore constructed an angular electrode-holder with a spring attachment at its extremity to hold the wires so that the current could be directly guided through each individual canal. A platino-iridium wire is best adapted for the electrode of the positive pole, because in virtue of its inflexibility such a wire can be readily carried into the narrow root-canals. Platinum is indispensable because almost all other metals combine with nascent oxygen and thus interfere with the desired effect.

The action of the electrolytic current is by no means limited to the immediate neighborhood of the electrode, *i.e.* anode; the antiseptic action is likewise active in the intrapolar region. Thus electrolysis takes place when the current passes from a conductor into an electrolytic substance or traverses the junction of two different electrolytes, *e.g.* the various tissues; that is, all the phenomena which occur in the immediate neighborhood of the pole also develop at the boundary between the tissues. At the junction of two different electrolytes (conductors or tissues) new poles make their appearance—virtual poles, so called, which act just like the actual metal poles provided the current possess sufficient tension as it traverses the boundary between the tissues.

It is precisely this development of virtual poles that is of most importance in dental therapy; for whereas the current applicable in the organism can hardly be of sufficient strength to penetrate the boundaries of the various tissues in strength adequate to generate electrolytic effects such as we see at the initial points where the poles are introduced, the conditions are much more favorable in the case of the teeth. During the passage of the current through the tooth but little current is lost through radiation; dental tissue is a very poor conductor, and the moist dentinal canals alone disseminate some of the current. These, however, are quickly desiccated from the decomposition which takes place, and sterilized, so that they soon offer no opportunity for radiation; thus the sides of the tooth act like a perfect insulator. That this really takes place, although it has been so largely denied, can be readily proved by the following experiment: If the apical foramen of a freshly-extracted tooth be closed by a non-conductor like gutta-percha, etc., the crown being also surrounded by some insulating substance, and the tooth now brought into a circuit, the current will at first be conducted through the dentinal tubuli, but at the expiration of a few minutes the walls of the tooth act as insulators and do not permit the passage of any current. This shows that the dentinal tubuli become desiccated and sterilized. The tension of the diffused currents is inversely proportional to the aqueous percentage of the tissues traversed. I also observed that in every experiment with test tubes containing salt solution, decomposition of the contained water into H and O taking place, spaces are formed which exercise an influence upon the strength of the current and so also upon its antibacterial action. Conditions in the mouth are much more favorable by reason of the circulation, fresh supplies of fluid being constantly brought into the region affected by the current.

It is now evident that the tissues in the neighborhood of the apical foramen become sterilized through the development of virtual poles; it is equally apparent that the effect is in no wise lessened by the greater or less depth to which the platinum electrodes penetrate the canal, and also that inaccessible canals are susceptible of sterilization as well as those large enough to permit of being probed.

In selecting the source of the current it is important to choose one that is capable of furnishing the greatest electromotive force possible, the resistance of the tissues, especially of the teeth, being at times almost incredibly great. As an example I may mention that if the current be applied to the dry skin by means of metal electrodes of 1 sq. cm. surface, it is opposed by a resistance equalling

100,000 ohms, whereas with large electrodes 5 sq. cm. in extent and covered with saturated flannel, the cutaneous surface being moistened with salt water, the resistance falls to 5000 ohms. A single element yields about one to two volts of electro-motive force. I therefore employed batteries of thirty to forty elements. When a central (street) current is used I select a rheostat permitting the passage of a current from 0 to 80 volts. If the root-canals are moist, or if suppuration be present, the resistance to be overcome is but slight. Dentin and perfectly desiccated pulp-remains, on the other hand, are extremely poor conductors.

But it is not alone the current strength which is of importance in electrolysis, but also the tension—that is, the relation of the current strength to the cross-section of the electrodes; in the case of two currents of equal strength the tension is inversely proportional to the diameter of the electrodes. The tension obviously is greatest at the points where the two electrodes are applied, decreasing thence as the distance increases, for the current upon entering the tissues divides into innumerable branchlets and rejoins the other electrode through those tissues which are the best conductors. The best conductors are the muscles, the nerves and bones the next best, and in the following relative proportions, 1:2:16. The tissues farthest from the electrodes and intervening conducting path receive but little current. Nevertheless, experiments have shown that regions far distant from the electrodes also receive some current. In dental practice it is desired to limit to a narrow region, namely the tooth, the effect of the current, viz, generation of Cl, O, and H_2O_2; to close the circuit it is necessary to have recourse to other parts of the body for the apposition of the two electrodes. For this purpose we employed electrodes of very unequal diameters, a small one to concentrate the current within the tooth and a large one to be applied to a readily accessible part of the body, for example the hand. The large size of the second electrode prevents the occurrence of painful or uncomfortable sensations near the point of application.

The method of sterilizing a putrescent tooth by electrolysis is in brief as follows: After thorough excavation of the putrescent pulp-chamber, all consistent masses are to be removed, if at all possible, from the root-canals with an extractor, and the same gently cleansed to prevent at all hazards any ptomains which may be present from being carried through the electrolytic action of the current into the periosteum. If the root-canals are too narrow for probing, a condition frequently present in such teeth, or if new formation of dentin has occurred, no attention is to be paid to the contents of the canals. We must above all seek to render the canal contents a good conductor; this is accomplished by thorough saturation with normal salt solution. For this purpose I inject a 0.75 per cent. aqueous solution of salt by means of a Pravaz syringe into the canals. All conduction between the pulp-chamber and the gum must be interrupted; this can be effected by carefully drying the sides of the tooth; the application of an insulating layer of gutta-percha—or cement may be necessary if the tooth contains a metal filling or if the gum has perforated into the cavity, etc. For if conduction to the mucous membrane of the mouth occurs, the current applied within the tooth will follow the path of least resistance and we cannot be certain that it has traversed the length of the affected tooth. After thoroughly moistening the root-canal and drying the crown, a platinum wire is introduced into the root-canal as far as possible, taking care not to penetrate the apical foramen.

The wire is to be connected by means of the electrode holder with the positive pole of a constant galvanic battery consisting of about thirty to forty cells, or with the terminus of a central current equivalent to the battery; the negative pole is to be applied to the hand of the same side by means of an indifferent electrode (preferably underlaid with moistened cork). The current is now to be gradually and uniformly introduced and

carried to 1.5 milliamperes and be permitted to pass for about five minutes. Slight variations in the strength of the current, due either to desiccation of the tooth or gradual saturation of the previously dry skin of the hand, are not noticed by the patient, being so gradual; they can be readily corrected by a rheostat.

When an electric current traverses several different conductors it divides so that each one receives a portion proportional to its conductivity. It is therefore possible to successfully sterilize simultaneously all the canals of a multi-rooted tooth only on condition that they offer the same resistance. If, for example, the two canals of a tri-rooted molar are accessible to probing and the third is not, it will only be possible to treat simultaneously the two widest. The inaccessible canal will require separate treatment, the two remaining canals being closed if necessary toward the pulp-chamber with gutta-percha.

As the result of a single treatment the tooth is rendered sterile to such a degree that an antiseptic filling may be inserted and left in place from three to eight days without danger. At the second sitting the current is to be carried through the tooth in the same way during five minutes. Devitalized teeth without pathological changes exterior to the apical foramen are practically sterile after the second treatment, and ready for filling. I fill the roots with a paste of Paramon, thymol, and oil of cloves with zinc oxid, which I pack into the canal by means of small pellets of sterile asbestos cotton. This paste is very good, its only drawback being its unpleasant odor. Abscesses about the apical foramen of a maximum diameter of 0.5 sq. cm., and fistulæ, require three to four treatments carried out as above. The more pronounced the suppuration the more powerful also is the electrolytic effect of the current, so that a satisfactory result may always be depended upon provided that the necrosis does not involve an extent of tissue greater than 0.5 cc. It is not absolutely necessary to employ rubber dam, but under all circumstances we must prevent the entrance of saliva while the current is passing—not from fear of infection, but because the current would be carried by it to the oral mucous membrane and thus give pain to the patient.

For the sterilization of pockets within the gum, due for example to pyorrhea alveolaris, a somewhat stouter right-angled platinum wire may be employed. An electrolytic current is to be carried through this into the pocket as before.

In December of last year I had the opportunity of assisting Prof. W. D. Miller of Berlin in certain bacteriological researches undertaken at my request. These researches, in proof of the practical results of electrolysis, showed that if putrid pulp to which pure cultures had been added and through which a constant electrolytic current of 0.6 milliampere as a minimum had been allowed to pass for ten minutes was transferred upon agar, growth did not occur.

Moreover, Professor Warnekros of Berlin and myself tested the germicidal action of the electric current. The results were in the highest degree satisfactory. The decrease in the percentage of germs in experiments with extracted teeth infected with pure cultures, after ten minutes' passage of a constant electric current of 1.5 milliamperes was 97 to 100 per cent., experiments upon patients giving 86 to 100 per cent. For these experiments upon patients such teeth were usually selected as had occasioned pathological changes of the periosteum. The fact that the decrease in the number of germs was not complete is probably due to the circumstance that the bacteria, after the initial action of the electric current, get as it were into a voracious condition, when it is difficult to destroy them. For this reason I divide the treatment into two sittings of five minutes each, with an interval of two to eight days. The bacteria still vital after the first sitting slowly proliferate in the interval between the treatments, and can be more readily destroyed at the second sitting, when the decrease is regularly 100 per cent.

These striking proofs of the antibac-

terial action of the constant galvanic current influenced me to attempt the treatment of putrescent deciduous pulps in the same manner. In these cases my method is as follows: After thoroughly removing all putrescent masses from the pulp-chamber, and from the root-canals also if possible, I carry the platinum wire of the anode a very short distance into the canal, the cathode being applied as usual to the hand of the corresponding side; the current is then admitted up to a strength of 0.6 to 1.5 milliamperes. Because of the large apical foramina I have always avoided currents of greater strength. The current is allowed to pass from two to three and even five minutes; the pulp-chamber is then closed toward the root-canals with a thin plate of metal or gutta-percha, which is not allowed to enter the canal. The tooth is then filled with gutta-percha or cement. Thus the root-canals are left empty. Even if the periosteum of the root be diseased, I would advise that trial at least be made of the conservative treatment, especially in the case of deciduous teeth, because of the possible subsequent anomalies of position which may occur.

For the source of the current we may employ batteries of different form and construction; a central current is, however, the most convenient. It is indispensable for our purpose that the current be introduced gradually—that every sudden or abrupt increase in strength be rendered impossible; all this is to be regulated by a rheostat. The more gradually and uniformly the flow begins, the higher the strength which can be borne; the stronger the current which can be employed, the more intense is the effect and the fewer the sittings necessary. Properly constructed batteries may not require a rheostat; still it is better to employ one, because more accurate regulation of the strength of the current is possible through it—an indispensable circumstance where electricity is applied to the head. Especially is a rheostat desirable when but few cells can be used by reason of low resistance of the tissues. I have tried both metal and fluid rheostats. For some time past I have been using a central (street) current; not the slighest variation of the current strength has been noted. My connecting apparatus permits the gradual and constant passage of a current of electro-motive strength of from 0 to 80 volts.

"ETHICS."

By CLINT W. LA SALLE, D.D.S., Rochester, N. Y.

(Read before the Seventh District (N. Y.) Dental Society, at Rochester, March 30, 1904.)

ACCEPTING the term "ethics" in a sense covering the entire scope of man's duty—more particularly to his brother man—we enter a field rich with material for original research and replete with opportunities for discussion. In order to make proper application of ethics to professional life, it is necessary to trace a system of morality from its inception to the present, as well as to discover the conditions that demanded applied ethics.

In the early history of the man animal, when dawning intelligence was aiding him to overcome the obstacles born of his environment, his efforts were, of necessity, self-centered. Life was an unending and indefatigable struggle to maintain existence. Not only had he to cope with others of his kind, but he had to avoid the attacks of predatory animals as well. These early struggles furthered his mental growth and increased his intelligence. With increased intelligence the period of

infancy lengthened, and with this increased infantile period the need of protection of the young made itself manifest. While there is no doubt that the early man was possessed of the parental instinct that characterizes the brute creation generally, there is no question that infantile humanity was not properly protected until tribal organization took place.

This tribal organization—this co-operative arrangement—compelled man to assume a different relation toward his tribespeople in the concrete, than formerly as individuals in the abstract. It is not the opinion of the writer that this new relation was assumed by reason of any tendency in that direction. The tendency rather was opposite, and man cultivated unselfishness only as it furthered his interests to do so.

That man was primarily selfish is easily proved by the fact that from the earliest historical times the records of ancient peoples—records both sacred and profane, and traditions and legends as well—abound in stories of conquest. Conquest for what? For something B possessed which A wanted. If A were stronger, he got it; otherwise B administered a sound drubbing to A, and further, even took away what A possessed.

The wars of modern times, with few exceptions, present the same incentive—the desire to possess. Examples of this strong trait are so apparent today, even to the most casual observer, that I deem it unnecessary to enlarge upon it. This spirit exists not alone in the phase just mentioned, but is manifest in most of man's conscious actions. In fact, it would be difficult to prove that any action, however laudable, is not inspired by this spirit of self-interest. It must be apparent that this prime mover serves a purpose. And it does—a mighty and most important one. Without a perfect unit, what of the whole? Unless the individual be preserved, what of the tribe? Unless the individual (in the majority) co-operate with his fellow to the best interests of the whole, what of the individual?

Thus we see that in our present plan of civilization the line of direction of cause and effect is in a circle. From this state of things we may deduce the premise that the advancement of the individual, the conservation of self-interest in the highest sense, produces the greatest good to the many; and the highest good of the whole again furthers the best interests of the individual. This places an obligation on everyone that, while the individual furthers his own interests to his maximum ability, he must not overstep the bounds of thoughtful regard to the injury of some other. If this obligation holds good in a general sense regarding man's relations to his fellow, how much stronger its application to us, who, as public servants, maintain such peculiar and important relations to our patients and to our colleagues!

It is often assumed by the laity that reputable practitioners refrain from questionable methods of business-getting and refuse to perform certain operations because of the fear that such a course might endanger one's standing with the society, and thus deprive him of the prestige gained by membership therein. Again, we occasionally meet in the ranks of the organized profession one who is willing to resort to methods of business-getting considered incorrect by reputable practitioners—and condemned by them. He profits as much as he can by his membership in the society. This course is in direct violation of the premise above set forth—is counter to any dental code, and cannot be too harshly condemned.

I am moved to touch upon this matter because of certain flagrant violations of this nature which I have encountered. Men who violate the ethics of the profession consider the restrictions of the code of this society onerous and unnecessary. It is our purpose to show that such ideas and any others opposed to the code are erroneous, and further, that the code of ethics is correct and for the best interests of the profession and the community at large. The code establishes with complete definiteness the relations dentists should bear to each other and to the public.

In section 4, article 2, of the code of our society we note that the attitude of a practitioner when consulted by the patient of another (as therein set forth) is entirely in accord with the highest plane of moral law. It protects the other man's interests to one's own gain, in that one feels that the other has been obligated to extend the same courteous treatment in like case. It protects the highest interests of the profession by showing the patient that there is not rampant in the profession a spirit of commercial competition which allows one to gain at the loss of a colleague. This practice, universally followed, advances the best interests of the profession as a whole, and accords perfectly with the premise just set forth. Rigidly followed, this section of the code should eliminate the possibility of one regular practitioner appearing in court as expert witness against another equally reputable.

But (I hear someone ask) suppose a man give evidence of crass incompetence, of gross inability, shall we allow the public to suffer at his hands and suffer ourselves through association with him? I answer: How is it that such a man was allowed membership in the organization? If not certain of a man's fitness in every particular, let us wait until we are certain before admitting him to membership in our society. Let us make our standard so high that to be a member of this society is tantamount to a broad declaration of every member's fitness in every detail to merit the entire confidence of the public.

At this point I wish to touch upon a prevalent evil which appears to grow in virulence as time passes, viz, suits for malpractice. If it were impossible to get a reputable practitioner to appear in court against another, it would discourage some of those vampires who are looking for a chance to victimize some unlucky wight who may fall a victim to their machinations through no intention to commit a wrong.

I think it will be conceded that a malpractice suit is "easy money"; and many of these suits are brought for this reason. It has been pointed out that the greatest element of harm is in having these suits brought. The publicity of a suit is damaging, even though one make a successful defense, the greater damage by far resulting to the practitioner from the loss of public opinion.

In the light of these deductions where do we stand? What is our duty as moral factors in the world's advancement? In order to achieve to the best advantage the noble ends which lie before us, and toward which it is our duty to put forth our best endeavor, we must have absolute unity. And, speaking plainly, just how much of this do we find—in spirit and intent?

We do not wish to be considered pessimistic; but we will instance some of the occurrences which led to this question. In another city a young practitioner performed a certain operation, and though no intent to defraud the patient or slight his work existed, the operation failed of entire and absolute success. The patient consulted another practitioner, who took measures to correct the condition present, detected the mistake of the other and told the patient the nature thereof. The patient sued the first practitioner for malpractice and the practitioner ultimately lost the action.

It is not our intention to pass opinion on the merits of the case or the right or wrong of the second man's action, save in their ethical bearing. It would appear that in order to do justice to the first practitioner the patient should have been referred back to him. Failing in this, the first should have been notified by the second that the patient had consulted him. This would have given the first an opportunity to hand the second a history of the case as he knew it. And if the second had done his duty in an ethical sense, he would have avoided in every way in his power the perpetration of the slightest act or the utterance of the slightest inference that would cause that patient to think the slightest grounds existed for assailing the first gentleman in a court of law. The unity of the profession in that city would have been promoted and the second practitioner have retained the good will and respect of a

large number of the profession, which, safe to say, he has lost.

As a result of the second practitioner's course of action he gave the public a hint of the possibility of an action for malpractice, and the profession suffered to a great extent in the city where the incident occurred.

Again, an individual employs a reputable dentist to perform certain operations. Conceiving the notion that he has grounds for dissatisfaction, he consults another man of good standing. This man, desirous of appearing fair in the matter—yet not unwilling to gain a patient—praises the quality of work done, but questions the judgment of the man doing it. Aside from the fact that it is none of the patient's concern wherein these gentlemen differ, is it not as harmful to accuse one of lack of judgment as to accuse him of incompetency? Does one not suffer in the one case as sorely as in the other, as far as the patient is concerned. Does not one so doing harm himself more than the other? Suppose for a minute that he met failure in the case of this patient. Would not his attitude toward the other man cause the latter to rise up and condemn him with that patient? Does he not threaten the welfare of the profession at large by his veiled implications against his professional brother, and in so doing create a retributive agency that will prove a boomerang against himself?

In this case, as in the others instanced, the dictum is apparent that the welfare of one is the welfare of all, and *vice versa,* and that in considering the interests of the other first, one serves one's own ends best. In this case, I say, this fundamental principle has been violated. I might relate a number of instances, each having its peculiar bearing on some vital ethical principle, but consider those cited above sufficient for academic discussion from an ethical viewpoint.

In my study of ethics, both general and professional, this central truth has forced itself into recognition: That the man who seeks gain at another's loss is not truly selfish, because he defrauds himself in the end. But the one who considers the other's welfare in preference, serves his own ends best. This is selfishness of the right sort; selfishness fully in accord with natural law and with any logical line of ethical thought.

My plea is for a broader and more general discussion of this subject. During the time I have attended dental society meetings, every dental topic on the footstool save this one has been discussed.

The code should be our creed, should be the religion, if you will, by which our professional life should be governed.

I admit that the ground taken by me in this paper is exalted and rather ideal. Why should it not be? We look almost without hope of finding it, it seems, for the perfect filling. We would welcome with resounding pæans of joy a certain panacea for that old friend and bugbear "pyorrhea," and in all our efforts strive to attain the perfect—the absolute. Let us take our code then, make it as perfect as human ingenuity can devise, and then as far as human frailty will allow—follow it!

THE QUESTION OF ACID EROSIONS OF THE TEETH.

By EDWARD C. KIRK, D.D.S., Sc.D., Philadelphia, Pa.

I FIND in the paper of Dr. Hinkins which appears in this issue a criticism of my paper published in the *Items of Interest* in July 1902 because I do not refer to his paper read before the Third International Dental Congress and give him credit for his views as to "the rôle played by organic acids in the failure of cements and tooth-structure." I was unfortunately unable to hear the paper of Dr. Hinkins read at the St. Louis meeting owing to the demands upon my time and attention in connection with my official duties, hence I was unable to reply to his criticism at the time it was made.

I am quite familiar with the contents of Dr. Hinkins' paper read in Paris in 1900, and have recently re-read it with care, and I am unable to see what bearing the paper has upon the question of dental erosion other than the fact that he has by his researches shown that cements are soluble in the acids produced in the human mouth as the result of fermentation set up by certain classes of micro-organisms. I take it for granted that the facts which Dr. Hinkins' researches tended to prove are generally accepted by all who have given any attention to the question, especially as this general fact was also clearly demonstrated by the researches of Miller nearly twenty-five years ago in his study of dental caries. As this same fact is the major conclusion stated in Dr. Hinkins' Paris paper, and as he makes no allusion whatever to erosion, I did not deem it necessary to quote his paper as an authority on that subject. I did not think it necessary to refer to Miller's researches either. The fact that acids are produced by fermentative processes in the human mouth has come to be part of the common knowledge of dentistry; so likewise has the fact that it was the research of Miller which established it, and to constantly credit Miller for the discovery of that truth is in these days to somewhat underrate the intelligence of one's audience, just as it would be to credit Columbus with the discovery of America, for example.

I observe that Dr. Hinkins in his Paris paper also thought it unnecessary to refer to Miller's original researches, though it seems to me they have a very much more direct bearing upon Dr. Hinkins' research than Dr. Hinkins' research has upon mine.

Dr. Hinkins—and let me quote him exactly—says, referring to my *Items of Interest* paper: "The theory is discussed that erosions may be due to the action of lactic acid and the acid phosphates of sodium and calcium upon the tooth-structure. We wish to point out that in our paper read in Paris in 1900, we pointed out the rôle played by these organic acids in the failure of cements and tooth-structure—and in view of this, Dr. Kirk's hypothesis is not new."

Dr. Hinkins' paper dealt with the action of certain organic acids upon cements. The only reference which he makes in that paper to the action of these same organic acids on tooth-structure is as follows: "$Ca_3(PO_4)_2$ is very similar to $Zn_3(PO_4)_2$ in properties, and certainly would be slowly dissolved by the *acids formed in the seat of decay.*" This is the only reference which I am able to find bearing upon the solution of tooth-structure in Dr. Hinkins' paper to which he refers. I submit that in a discussion of the etiology of erosion, the suggestion that a certain type of erosion may result from an excessive general fermen-

tation in the mouth is not one of the inferences which would be likely to be drawn from the above quotation from Dr. Hinkins' paper; and his claim that, because of this, the suggestion that the acids of fermentation may be the cause of dental erosion is not new, is a rather liberal application of Dr. Hinkins' hypothesis as to the solubility of calcium phosphate in lactic acid. I have used the word hypothesis in this connection, for Dr. Hinkins surely puts his case hypothetically. Just why he should do so is problematic, in view of the fact that Miller's researches clearly demonstrated the fact that acids formed by fermentation at the seat of decay do actually dissolve the calcium phosphate of the tooth-structure, this process constituting one of the essential factors in dental caries.

But Dr. Hinkins goes farther, and refers to the acid phosphates of sodium and calcium as among the subjects of his investigation, and includes them in his general grouping as "these organic acids." I am unable to find that his Paris paper deals with the solvent action of sodium or calcium acid phosphate upon tooth-structure in any degree, and in any event they are not organic acids.

If I am in error as to any of the foregoing points of fact, I shall be most happy to give to Dr. Hinkins any credit to which he may be entitled.

Again, Dr. Hinkins objects to the mode of investigation employed in determining the nature of the salts which I reported as having been found by me in the case described in my *Items of Interest* paper, and says: "We do not feel that reliable conclusions can be drawn from such data. There are many thousand different substances with the same crystal form. Unless these crystals are isolated and subjected to a chemical analysis, one can draw no conclusions in regard to their chemical composition. Aside from this, it has been known for some time that calcium acid phosphate is a normal constituent of the saliva, and that lactic acid is formed by bacterial agencies in the mouth. The presence of these lactophosphates does not, therefore, prove that they arise from tooth-erosion."

I differ with Dr. Hinkins on several points of fact which he has raised in the above-quoted paragraph. In the first place, his statement that "There are many thousand different substances with the same crystal form," while it may be true as a general proposition, is certainly not true as related to the investigation of saliva. For example, I am quite well aware that all of the alums, of which there is an almost innumerable variety, crystallize in the isometric system. I am also aware that the diamond crystallizes in the same system, but I am also aware that no alums in any of their varying compositions, nor the diamond, are found in the saliva. By which proposition it is my intention to convey the idea that there are "many thousand" of crystallizable substances which in the very nature of the case are excluded from consideration in the study of the saliva; and it is not true as a matter of fact that there are "many thousand" of substances having the same crystal form to be found in the saliva. The field is a much more limited one than that.

The method by which the identification of the several crystals as referred to was made, in the opinion of those who being expert chemists are men competent to pass judgment thereon, is of at least equal accuracy with the modes of ordinary chemical analysis. There are other methods than by chemical analysis to determine the identity of various chemical substances. For example, the manufacture of Bessemer steel, which depends upon the most careful adjustment of chemical relations in the finished product, is finally determined by the aid of the spectroscope at the time when the steel is undergoing formation in the Bessemer converter. Nobody today doubts the accuracy of the qualitative determinations made by the spectroscope, and no one who has paid attention to the matter and is familiar with the methods of polariscope study will have any doubt as to the positive value of the optical reactions of certain crystal forms under the polariscope. I can only account for the

remarkable statement made by Dr. Hinkins as above quoted upon the ground that he has not given that close attention to the use of the polariscope in the study of the saliva that would warrant him in coming to a judgment upon the merits of the method.

I regret very much that Dr. Hinkins has felt himself wronged by my failure to recognize the value of his very meritorious work. Had I been able to see that there was even a remote connection between the proposition which he had under investigation, and which he most satisfactorily solved in his paper, and the subject which I had under investigation and presented in my *Items of Interest* paper, I should have most cordially given him credit for the suggestion. But because Dr. Hinkins has shown that cements are soluble in the acids produced by fermentations, he has by no means shown that cases of erosion of the teeth are also produced in the same way.

I take issue with the statement of Dr. Hinkins that calcium acid phosphate is a normal constituent of the saliva. On the contrary, it is always an abnormal constituent of the saliva. The normal saliva is not acid—a fact which I believe is generally accepted. Calcium acid phosphate in the saliva is an indication of the faulty action of the nutritive processes, as I have elsewhere pointed out.

Finally, if Dr. Hinkins' statement were correct, that calcium acid phosphate is a normal constituent of saliva, and lactic acid of fermentation is present to any appreciable extent in the saliva under ordinary conditions, then we should find calcium lactophosphate in normal salivas, which is not the case. That calcium lactophosphate may be formed as an artifact in salivas not protected from fermentation before examination by the polariscope is a conceivable possibility; but that source of error is provided against by means which effectively prevent fermentative decomposition of the fluid before analysis.

PROCEEDINGS OF SOCIETIES.

FOURTH INTERNATIONAL DENTAL CONGRESS, ST. LOUIS, MO., AUGUST 29 TO SEPTEMBER 3, 1904.

(Continued from page 247.)

SECTION IV: Oral Hygiene, Prophylaxis, Materia Medica and Therapeutics, and Electro-Therapeutics.

Chairman—Dr. A. H. PECK, Chicago, Ill.
Secretary—Dr. J. G. REID, Chicago, Ill.

FIRST DAY—MONDAY, AUGUST 29.

The section was called to order on Monday, August 29, 1904, at 2.30 P.M., by the chairman, Dr. A. H. Peck.

The first order of business was the reading of the chairman's address by Dr. Peck.

The next order of business as announced by the chairman was the reading of a paper by Dr. C. R. TAYLOR, Streator, Ill., on "The Human Mouth and its Hygiene," as follows:

THE HUMAN MOUTH AND ITS HYGIENE.

The first forms of animal life consist of animated drops of jelly-like protoplasm; the drop moves about by being able to project any portion of the body—as with the motion of straightening a finger—and then following with the rest of its mass until it again assumes a globular form. It has no distinctive organs and seems to have only one sense, and that is the elemental sense of touch. Through that power of sensation it selects the kind of nourishment it needs, by enveloping the food and thus using any and all parts of its mass to digest and assimilate the food necessary for sustenance and growth. Having no organs, all its parts are equal, there being no division of labor by organized effort. It eats, digests, and reproduces itself without specialized organs. Nature was not content for animal life to be merely a mass of protoplasmic jelly: for in that little mass of protoplasm lie hidden all the potentialities of being, up to the intricate and refined organism—man.

All the functions of life at some stage of being imply conscious effort. When in the earliest forms of life there are no organs, digestion and assimilation are voluntary conscious acts, as is eating in the later forms. Eating and assimilating, seemingly, are all that the being knows. It seems to be simply an animated appetite. As life enlarges and special organs are formed the functions become involuntary—when in their normal state—and are performed unconsciously by the individual. As life moves forward it takes on special functions. These changed parts of the mass become organs, and as these organs and their functions increase, the forms of life become more complicated.

Among the very first organs—and one of the most important—is the digestive cavity, which at first consists of simply a cup form for the purpose of absorbing nutriment, but by degrees enlarges into mouth, esophagus, stomach, and intestines. From this primal digestive tract are evolved, as offshoots, all the organs of respiration, digestion, secretion, and excretion. Clodd, in his "Story of Creation," says: "And the important part which the mouth plays as the immediate channel between the animal and its surroundings accounts for the development of the higher organs of communication

near it." The nose, eyes, and ears are associate members with the tongue to aid the mouth in the proper selection of food. In fact, the eyes, ears, and nose are most important factors in the preparation of the digestive organs for the assimilation of food even before it reaches the organs of taste. Not only is man's mouth made to water, but the mouths of the gods are said to do so when the nerves of the nose are excited by "sweet smelling savors" of food. Want of some kind unsupplied is the great incentive to life. The first and last demand of man is the necessary amount of oxygen to keep the machinery of life going; so all the senses are closely associated in position and function to apprehend and supply the wants of animal life. As the undeveloped digestive tract (alluded to above) changes under the laws of "correlation of organs," all the other organs of the body change. For instance, the demands of the digestive tract of the tiger have developed the sharp teeth and sharper claws characteristic of this savage beast. Whatever food the alimentary canal calls for, the outer organs of the body are prepared to furnish. Back of all the phenomena of life, is life itself, which has the capacity and power of being all that the circumstances will permit or force it to be. What life is no one knows; but whatever it is, it precedes form, and its possibilities of development can only be conjectured.

The use or non-use of organs may mean progress or degeneracy to the animal possessing the organs, but it always means degeneracy to the organs not used. Animals which show a disposition not to use their eyes, finally lose them; and creatures which develop a desire to fly have wings given them. The *Balæna mysticetus* whale changed its mode of living and took to the water; nature gave it sifting baleens and took away its teeth. The whale became an oil-tank.

The owl evinced a disposition to eat things that live in dark places, so nature gave it big eyes, a sharp beak and claws, and soft feathers—all members of a description to help it in its predilected mode of existence. And as for the Cestoid, whose requirements of life were very modest, nature gave it a head without brains, just hooks and suckers to attach itself to its host, and it became a tape-worm, floating in its food, with power to absorb its nourishment through the body.

To the paleontologist a knowledge of the organs of mastication explains the anatomy and habits of the animal to which the organs belong. It is through the mouth—and by mouth is meant the power to select and assimilate the kind of food the creature prefers—that all changes of anatomical forms have largely come, because of the fact that the kind of food selected has been the primary factor in making the forms that life assumes. The dental organs tell the story of the past, the present, and—to a large extent—the future habits of the animal. The physical and climatic environments are important factors in life forms, because they produce the food to be selected; but when once the food is selected the character of life to be developed is determined.

So far as we know, man is the masterpiece of life's production, and of all his features his mouth is the most expressive and characteristic. The mouth performs many functions beside those of mastication and insalivation of the food. Primitive man often used his jaws and teeth as weapons of offense and defense, and modern man frequently makes his mouth supply the place of a third hand when needed. All people, excepting the Japanese and a few uncivilized tribes, use either contact of the lips or regions near the mouth to convey the outward manifestation of love and affection.

The mouth is the only opening through which the body receives nourishment, triturates, and insalivates it, and thus in a rough way prepares it for further digestion. In the mouth is located the special sense of taste so closely associated with the sense of smell, and in the senses of smell and taste lies the beginning of digestion. The senses both of smell and taste aid in the nerve stimulation of the salivary glands, and their excitation starts the muscular movements of the whole alimentary canal, which in turn

causes all the glands of the tract to perform their duties as the food manifests its presence in their locality. In the mouth reigns supreme that most wonderful organ of touch, taste, and speech—the tongue. Out of this vestibule of the body—the mouth—comes the melody of sounds, of song and laughter; through it the gift of speech makes itself known and enriches life, and by it the divine intellect gives its commands. By its use the orator moves the hearts of his hearers, and through it man communes with his gods. Emerson says, "If the tongue had not been framed for articulation, man would still be a beast in the forest." Poets have sung of pearly teeth and cherry lips, and the beautiful curves of "Cupid's bow" have been admired and drawn by the greatest artists.

A critical knowledge and a clear discernment of the outer and inner parts of the mouth, and their relations to each other, are of utmost importance to the dentist. This is particularly so in the arrangement and adaptation of artificial substitutes for natural teeth, and the adjustment of teeth in position when regulation of the natural teeth is required. That the peculiar relations of the lips to the parts of the oral cavity make difficulties hard to overcome is well known to those who make artificial dentures. What is more trying than a prominent alveolar ridge and a short lip with a raised corner? No part of the face has more to do with its expression than the mouth. This is due to the muscular arrangement and mobility of the external parts.

All the emotions of the soul, intellect, and body find means of expression at the mouth and adjacent parts. Anger, joy, grief, vexation, exultation, and contempt cloud or illuminate the features at this portal of the face. In some persons the upper lip has no range of expression in speaking; it simply hangs in position, like a leather curtain,—and yet when it is imperfect in form, as in hare-lip, the whole face and features are badly marred. The expression of the mouth often gives a clue to the mental and spiritual qualities of the individual. In the form of the mouth and the set of the lips and lower jaw is often revealed the motive force of the individual. No matter how intellectual or moral he may be, if he possess a weak mouth and retreating chin he will fail for lack of forceful expression, though he be in reality a genius or a saint.

In the ages of evolution, the mouth and teeth have been important factors in the struggle for development, calling forth energy, endurance, and courage. How often patients say, "If I could but shut my teeth together, I could endure the pain more readily." The form, size, and arrangement of the teeth and jaws should indicate the kind and form of the many operations in our profession. The mouth is of special interest to the dentist, and yet how few of us know all we should of it in health and disease? It has many vital and varied stories to tell to him who is wise enough to see and interpret them. How many notice in detail the variations from health to disease in the various soft and hard parts of the mouth? And yet there is no portion of the body that so plainly shows forth the state of health as does the oral cavity. To the learned and discriminating diagnostician the mouth betrays the secrets of insidious diseases of local and systemic character. The color, weight, and other characteristics of the secretions and the shades of color and peculiar physical expressions of the mucous membrane and the odors arising therefrom, are frequently infallible guides in diagnosis. Drs. Michaels of Paris and Kirk of Philadelphia are teaching the profession how to discern the state of the whole body by a perfect knowledge of the conditions manifesting themselves in the mouth through the saliva. Such a knowledge and wisdom of discernment is most important to the practitioner if he is to fulfill his mission to his patients.

The conformation of the head has much to do with the general form of the alveolar arch and arrangement of the teeth. Persons having long and narrow heads have correspondingly long, narrow-arched mouths, while persons having round or square-shaped heads usually

have alveolar arches conforming somewhat in shape to the contour of the head. In Europe there are at least three well-defined types of racial heads and dental arches, namely, the Baltic (called the Teutonic), the Alpine, and the Mediterranean. In this country these European races are so thoroughly intermarried with other races that typical cranial conformations have lost their original form, resulting in a conglomeration of small teeth in large jaws, large teeth in small, contracted arches, with disastrous malformations and degenerate tendencies in the teeth, alveolar processes, and jaws. This diversity in the form of the head and features should be a matter of great concern and study by those who make artificial substitutes for the natural teeth; for a full knowledge of these facts combined with the requisite technical skill would prevent a great many of the hideous mistakes we constantly see grinning at us in the mouths of persons who patronize dentists who use the same mold of teeth for all kinds of people, and arrange them on the same general contour. Let us get away from the idea that there is any divine ideal in the human mouth, and study each mouth as it is or should be to conform to the features of the individual seeking our services. The form of the head and general features of patients seeking the correction of irregularities of the teeth should be studied carefully by the orthodontist, so that the rearranging of the teeth may conform to the natural cranial and facial conformations of the individual. Whatever a race of people eats, does, and thinks is reflected in the shape of the head, mouth, and features, and if taken in hand in early life these parts may be modified in the individual.

Few realize that the final results of mastication are not fully attained by the comminution and insalivation of the food. Important as these processes may be, there is another very important function performed by these acts, namely, the development of the organs of mastication and their continued good health, brought about by their full use. Herbert Spencer says, in "Principles of Biology," vol. i, page 161, "In the higher animals, however, the performance of the alimentary functions depends on the performance of various muscular and nervous functions. Mastication and swallowing are nervo-muscular acts; the rhythmic contractions of the stomach and allied vermicular motions of the intestines result from the stimulation of certain muscular coats by the nerve fibers distributed through them; the secretion of the several digestive fluids by their respective glands is due to nervous excitation of them; and digestion, besides requiring these special aids, is not properly performed in the absence of a continuous discharge of energy from the great nerve centers."

May it not be possible that herein lies the source of so many cases of faulty metabolism among civilized men? The differentiation and specialization of the alimentary canal in man is so complete that any imperfection in the action of digestion in one part makes it difficult if not impossible for the other parts to complete what should have been done in the region at fault. As an illustration, the imperfect trituration and mixing of the food with saliva in the mouth leaves the stomach unable to complete the process of digestion. In the lowest forms of life any part of the body is capable of performing any function the organism requires, but in man few, if any, organs can perfectly and completely perform the functions of another. The result is that the most disastrous consequences follow the hasty and imperfect use of the mouth in the initial and most important part of digestion.

Too much empiricism is indulged in by indicating the kind of food one should eat, when the fact is that man has always found his accustomed food equal to his physical needs—if he could only get enough of it. More people are dying from too much, rather than from too little, food. From the rice marshes of China to the blubber fields of the Arctic regions, nature has given man sufficient bone- and muscle-making material in his food to insure enjoyment of good health when he has

performed all the duties and functions that nature requires of him.

Life's calendar registers no lottery; there are few prize packages in nature's work. She makes few continuous-gum sets at rubber prices. Vicarious atonement is very imperfectly carried on in nature's laboratory. Man's development of the pampered pug dog's dental arch shows what the present civilization is doing for man's.

Abundance means prodigality; but a temperate strenuous life bordering on want means physical perfection. Nature's fountain of life is not found in "Sunny Jim's" laboratory, nor does it stream through the glass bottle and rubber tubing of the nursing bottle. Nature seems to care very little for the individual, but she makes a supreme effort to save a race. Man has learned how to develop the domestic animals, but is not willing to pay the same price for his own perfection. The teeth and their perfection are due to the necessities of life; when the necessities cease, the teeth will pass away. There are too many millers and cooks, who do the work the teeth should do. If the human race is to retain its teeth there must be a more thorough use not only of the teeth themselves, but of the whole masticating apparatus; this means that there must be a greater amount of nervous and muscular energy put into the chewing of food. And if we are to do our duty to our kind, as professional men, the work of the future will be preventive rather than curative, and the methods pursued will of necessity be along the line of observing the natural laws of health rather than pursuing artificial means of preventing disease.

All organs are the results of cause and effect—because of the necessities of their being—and they are as perfect as necessity requires under the law of use and disuse. The laws of hygiene are the natural laws that govern the growth and conserve the health of each order of being, and when those laws are observed "health is catching," and all the organs of the body work together for good for the whole being. When for any cause an organ fails to perform the functions for which it was prepared, disease of that organ commences and all the associated organs are abnormally affected. Most of the dental hygiene advocated and taught at the present time is simply artificial, or temporary, and the results are very imperfect. Nature makes no mummies, but does everything she can to make and conserve useful living beings. The whole earth is a graveyard of obsolete beings who failed to meet the conditions of life necessary for their continued existence, and the dental organs of man are fast becoming obsolete under the same immutable laws. Their only possible salvation is in the full use of the dental organs.

Filling and cleaning of the teeth *per se* add no perpetuating force to the teeth; such procedures simply conserve a certain person's teeth for a shorter or longer time. Nature's way is to put the teeth to work; and when the laws of nature are fully complied with the teeth need no filling or artificial cleaning, for they are as perfect as they need be to fulfill the functions of their existence. The customs of civilization are not always based upon biological laws. The range of life is confined within a very limited field. A few degrees of variation in cold or heat will annihilate all the life-germs on this earth. A complete change of food in quantity and quality materially affects certain portions of the body. Temperature and food are dominant factors in all life forms. Civilization may through man's intelligence so change the organism of man that he will need no teeth. It would seem as though his personal appearance would suffer from such a change, from an esthetic point of view. A departure from the hygienic laws of nature in the care of wild and domestic animals results in the same disastrous effects on their organs of mastication. Slop-feeding of cattle produces diseased dental organs similar to those found among civilized man, so called. The probabilities are that decay of the teeth and most all other diseases of the oral cavity can be traced to systemic difficulties rather than to local causes—outside of imperfect mastication—which

accounts many times for the immunity from decay that prevails during the adult lives of most persons, with lack of immunity in early and senile life.

So the great effort should be to produce the proper hygienic conditions by a most thorough comminution of all foods, especially cooked starchy foods, before they pass the first organs of digestion—the teeth and saliva. Uncooked starchy foods are in themselves the best cleansers of the teeth during mastication. We have been told, until the saying is a trite one, that "The teeth will not decay if they are kept absolutely clean." The objection to this hypothesis is that it is impossible to keep the teeth absolutely clean. Observations and experiments show that all animals are immune from decay when they observe (consciously or unconsciously) the laws which make it necessary for them to have teeth.

This paper is not written to antagonize the artificial prophylactic movements necessary to be used to keep the teeth clean under our present food habits; but the serious question is whether or not the human race will have any teeth at all. The prophylaxis practiced and advocated by Dr. D. D. Smith of Philadelphia and others is of the utmost importance under our present culinary customs and food habits. There seem to be two ways of caring for the teeth; the first is the natural hygienic method of following and observing the natural laws of animal economy which produce and conserve the organs of mastication, while the other method consists in simply using artificial prophylactic means of keeping the mouth and teeth clean. The second method is too superficial to answer, except as a temporary expedient; it is simply individual and transitory in its effect. The first method has a creative effect, for it not only conserves for the individual but it creates and perpetuates for the race. It not only preserves the teeth, but it keeps all of the oral tissues and organs in their normal relations, and its effect on the whole of the animal economy is systemic: its essence is vital and elemental—for it goes to the bottom of things. We lay the emphasis in the wrong place when we say, "tooth-brush, pick, floss silk, and antiseptics." What is needed is oxygen, exercise, and natural food. It is our great duty to teach man to keep his mouth clean and in good order by using it most thoroughly and strenuously in the mastication and salivation of his food.

Discussion.

Dr. Chas. P. Pruyn, Chicago, Ill. I have listened to the reading of this paper with pleasure and satisfaction. I think Dr. Taylor is to be commended very highly for presenting to us such a paper. There is very little in it to which I can take issue or say any word of condemnation.

Dr. A. O. Hunt, Omaha, Neb. The paper in its general character pleases me. I do not believe that at this time and in this era of dentistry any individual could present a paper on hygiene of the mouth which would be entirely satisfactory or cause the profession to do much more than has been done for a great many years. Education along dental lines has only been going on for a few years. We hear about the wonderful advancement we have made, but when we come to think about it, it has been along mechanical lines mostly, and not for the preservation of the teeth. The well-qualified dentist of today is capable of taking a child at an early age and bringing that child to maturity with a good set of teeth without suffering from toothache or other pathologic conditions which arise in the oral cavity. The profession has reached the ideal that it set for itself fifty years ago—to save the human teeth. I am not one to discourage the efforts of any individual who brings to us any knowledge, or any experiments, or experience, or anything that will lead in the direction of prophylaxis. The statement that clean teeth will not decay is a truism. If they are absolutely clean, decay will not go on. We do not yet know all that we need to know and shall know eventually of the conditions in the mouth, whether infectious or otherwise, but to say that we are in a position to know positively what is causing the destruction of the human

teeth is untrue. We can say that the use of the teeth preserves not only the teeth but the gums as well. Many disturbances are present in the mouth that come from different causes, but the use of the teeth is certainly valuable. The statement that the conditions of civilization are producing poorer teeth than in former days is the greatest fallacy. Not many years since, our National Association spent a good deal of money, and many of its members a great deal of time, in examining the evidence that was at hand. The museums of the whole world were studied very carefully, and all the skulls possible were examined, and it is part of the transactions of the National Association today, or should be, that this idea is a fallacy, for numerous evidences are found that all the oral diseases with which we are now familiar have existed in all times and ages. The more highly civilized we are, the better the race. Look at the young people growing up today under modern conditions. Highly specialized food prepared in the kitchen tends to reduce somewhat the use of their teeth, but they are receiving benefits in other ways, and improved modes of living produce a better race of young people than we had twenty years ago. The teeth are better, because more people are interested in their care.

Dr. E. E. Haverstick, St. Louis, Mo. There is no doubt that if we had parents properly instructed and who would properly instruct their children, the next generation would have better teeth. The vital question is, How shall we instruct these children? There is but one way, and that is through the public schools and the public press. There is no use in expecting that because the parents care for their teeth the children will have better teeth, unless they take care of them. When I say "take care of their teeth," I mean the removal of all food particles from the surfaces of the teeth as often as food is taken. Another vital point in the prophylaxis of the mouth is in the saliva itself, because we often find it of acid reaction from the parotid glands and alkaline from the sublingual and submaxillary glands. When we can control the saliva we shall be able to do much for the preservation of the teeth of the next generation.

Dr. Taylor (closing the discussion). The most perfect teeth the world has ever known are in the animals that never saw a dentist. They simply obey the laws of their being, with no civilization to interfere and divert them from their own laws of being. Men who have observed these laws have had perfect teeth. Any animal which changes its food habits as man has done will lose its teeth as man is doing. The only perfect teeth are made through necessity. Man had them, but he wandered away from these laws and his teeth deteriorated. You will find in the study of biology that all depends upon the alimentary canal—that is, the food selected for it. It is here that life differentiates. Teeth will not exist where the necessity for them ceases. The muscles and jaws of man are growing smaller today because he does not use his teeth enough for mastication, and teeth are growing smaller simply from disuse. We must use our teeth if we would keep them.

Adjourned until 2 o'clock Tuesday afternoon.

Second Day—Tuesday, August 30.

The meeting was called to order by the chairman, Dr. Peck, at 2.30 p.m., Tuesday, August 30.

The first order of business was a paper entitled "Notes on the Therapeutics of the Accidents of Extraction," by Dr. Julio Endelman, Philadelphia, Pa., as follows:

Notes on the Therapeutics of the Accidents of Extraction.

Before taking up the discussion of the subject embodied in the title of this communication, the author wishes to disavow all claim to originality. The purpose of the paper is merely to review some of the therapeutic methods available in the treatment of the accidents which occasionally follow the extraction of teeth.

In looking over the literature of the subject, the writer finds that the number of recorded cases of post-operative accidents is markedly out of proportion to the great number of extracting operations performed without any attention whatever to the most elementary rules of asepsis. It may be said safely that 50 per cent. of operations for the removal of teeth are carried out in the most reckless way, with instruments not even clean in the ordinary sense of the term, and with the field of operation in as inviting a state for microbic invasion and development as it is possible to have it. These statements are the result of observation in private offices, and with very few exceptions all those that were visited exhibited a degree of carelessness almost criminal.

It is beyond the comprehension of an ordinary mind that men who employ the strictest asepsic procedures in the treatment of infectious conditions in root-canals and in other operations which may be properly designated as of minor importance when compared with the extraction of a tooth, should knowingly jeopardize the lives of patients by neglecting to sterilize their instruments and properly prepare the field of operation. But, fortunately for patients and operators, serious cases of post-extraction accidents are relatively rare. However, it should be stated that it is extremely difficult to collect reliable statistics on post-extraction accidents, or on any other subject for that matter, for the simple reason that operators are seldom willing to give publicity to failures, particularly as in a large proportion of cases they are the outcome of faulty surgical technique and inefficient aseptic precautions.

This phase of the subject brings us into close proximity to the interesting and far-reaching problems of resistance and immunity, and while we are by no means prepared to express a definite opinion on the factors which in some cases are responsible for the prevention of septic infection, we must state that from a clinical point of view the existence of defensive elements in the salivary fluids and oral tissues is beyond doubt. The resistance of tissues to pathological influences varies in direct ratio to the degree of health of the individual, it being greater the higher the health status, and *vice versa*. This is a point of direct practical importance in the sense that a greater degree of precaution should be observed with patients whose health status is low, and who on this account offer suitable fields for the ingress and development of pathologic micro-organisms. As already stated, the number of post-extraction accidents on record is small. A careful examination of the pages of the DENTAL COSMOS has enabled the author to collect a total of thirty-five cases, subdivided as follows:

Removal of the floor of the antrum: 2.
Contraction of the muscles of the forearm and flexors of the fingers and adduction of thumbs: 1.
Tooth impacted in bronchus—death: 1.
Swallowing of a tooth—death: 1.
Swallowing of a tooth—recovery: 1.
Fracture of maxillæ: 2.
Shock following extraction—death: 1.
Taking cold after extraction—infection: 1.
Migration of stump: 1.
Removal of tuberosity: 1.
Tooth in bronchus—recovery: 4.
Choked by a tooth—death: 1.
Pneumonia caused by a tooth in bronchus: 1.
Paralysis after extraction: 4.
Dislocation of mandible: 1.
Suffocation by swallowing of a tooth during extraction: 1.
Third molar driven into jaw during extraction: 1.
Fracture of palatine bone: 1.
Purulent infection after extraction: 1.
Purulent infection following fracture of jaw during extraction: 1.
Broken piece of forceps left in jaw after extraction—infection: 1.
Death after extraction—infection: 3.
Tooth slipped from forceps into trachea: 1.
Forcing tooth into antrum: 1.
Hemorrhage—death: 1.

It is interesting to note that out of the total of thirty-five cases, eight terminated fatally, a proportion of over 22 per cent. of fatalities. Three of the fatal cases were the result of infection directly traceable to foul instruments. Two were reported by Dr. Zakharevitch (*Vratch*, No. 34, p. 523, and DENTAL COSMOS,

vol xxvi, p. 697). In each of the patients, aged twenty-six and twenty-four respectively, the lower second molar was removed. Osteomyelitis developed in one case, and osteitis and periostitis of the mandible in the other. The third fatal case, the result of septicemia induced without doubt by the use of septic forceps, was reported in the German *Quarterly Journal of Odontology,* by Dr. Lanyi. In this case it is possible that the symptoms of general infection were only aggravated by the further introduction of pathologic micro-organisms from the infected instruments. However, a part of the responsibility for this death must be borne by the operator, inasmuch as the mixed infection which immediately followed the attempt to extract the tooth was unquestionably the outcome of a septic technique and faulty post-extraction treatment.

The fourth fatal case occurred during an extraction, and was probably caused by a strong cardio-inhibitory reflex the result of powerful stimulation of the terminal branches of the trifacial, the impulse traveling to the Gasserian ganglion, thence to the deep origin in the floor of the fourth ventricle, from whence the path to the motor nucleus of the pneumogastric is short and direct. Of the remaining four deaths, three were caused by the extracted teeth slipping into respiratory passages, and one by a persistent hemorrhage.

These statistics show altogether a total of seven cases of infection following extraction. Three of these terminated fatally, as described, and four recovered. A total of seven cases of post-extraction infection represents a proportion of a little over 20 per cent., a percentage sufficiently large and alarming to warrant a free and liberal discussion as to the best and most practical means of decreasing, and if possible of entirely eradicating the causes responsible for such results. The author is thoroughly aware of the questionable reliability of statements based upon statistical data, as the proportion of pathological conditions that may develop in different individuals in a given time cannot be determined by fixed mathematical rules and subsequent deductions. The personal equation is a factor which cannot be disregarded in matters relating to the life, resistance, pathologic changes, and death of cellular elements; and, as due consideration of this factor cannot be taken into account in the deductions that may be arrived at from a series of known cases, statistics are consequently useful only in the sense that they portray what the results might be if all conditions were to remain equal.

Post-extraction accidents may be divided into the eleven following groups:

(1) Fracture of the tooth operated upon, part of the root remaining in the alveolus and requiring a subsequent operation for its removal.

(2) Fracture or removal of an adjoining tooth.

(3) Fracture of a portion, small or large, of the alveolar arch.

(4) Dislocation of the mandible.

(5) Fracture of the jaw.

(6) Laceration of the gingival tissue.

(7) Wounds of the tongue, lips, and neighboring soft tissues.

(8) Inflammatory phenomena of microbic origin in the alveoli and cellular tissues of the mouth and cheeks, also in the substance of the mandible, producing osteomyelitis.

(9) General phenomena of infectious character.

(10) Reflex disturbances in the regions supplied by the fifth pair of nerves or by cranial nerves having a deep origin in proximity to that of the fifth pair.

(11) Hemorrhages.

The author intentionally omits accidents occurring in the course of anæsthesia and changes in the position of the teeth and the shape of the dental arches following the injudicious and premature extraction of deciduous or permanent teeth.

Groups 1-5. We shall have to omit from this discussion everything referring to these groups, as the treatment of those conditions is entirely beyond the province of the dental therapeutist, and shall begin with

Group 6—"Laceration of the gingival tissue." In such cases the operator's at-

tention should be directed mainly to the prevention of subsequent inflammatory and infectious phenomena. The author would recommend the cauterization of the lacerated tissue with a zinc chlorid solution of 10 to 30 grains to the ounce of distilled water, and the frequent use of an antiseptic mouth-wash. If a strip of gum tissue be torn it should be removed with curved scissors, unless it be of such a size as to expose part of the underlying bony tissue; in such a case it may be advisable that it should be held in place by a few interrupted sutures.

Group 7. In this group we include all wounds of the tongue, lips, and neighboring soft tissues inflicted during the operation. They are, of course, the outcome of carelessness or unnecessary haste on the part of the operator, and their treatment will necessarily vary according to the extent of the injury. One case is recalled in which the operator removed a lower tooth and with it a small portion of the tongue! The treatment should consist in the use of mild astringent and antiseptic mouth-washes, any one of the following formulæ being available for the purpose:

NO. I.

℞—Salicylic acid, gr. lxxv;
Alcohol, ℥ss;
Distilled water, Oj.

Sig.—Use as a mouth-wash three times daily.

NO. II.

℞—Boric acid, ℥j;
Sodium borate, gr. xxx;
Rose-water, ℥iv.

Sig.—Use ad libitum.

NO. III.

℞—Sodium borate, gr. xxx;
Thymol, gr. iij;
Distilled water, ℥viij.

Sig.—Use as a mouth-wash.

NO. IV.

℞—Hydronaphthol, gr. xv;
Alcohol, ℥j;
Distilled water, ℥j.

Sig.—One teaspoonful in a tumbler of water.

—T.

Group 8. From the therapeutic standpoint the treatment of accidents under group 8 is perhaps the most important, comprising those post-extraction phenomena which operators are most likely to encounter. Inflammatory phenomena, resulting from infection of the alveolus subsequent to the extraction, or by the retention of the pyogenic sac in the case of teeth the seat of alveolar abscess, is usually accompanied by severe pain. The onset of the attack in this type of cases does not occur until one or more days after the extraction. Incidentally, it may be stated that post-extraction pain is not always the result of inflammatory phenomena of microbic origin. It is caused occasionally by an undue degree of pressure from coagulated blood against the severed nerve filaments of the alveolus. Acute pain also appears in cases where the bony region, especially around a lower tooth, has increased in density as the result of inflammatory processes. Extraction of such a tooth will probably be followed by a certain degree of pain, as a greater amount of physical force will be required to dislodge the tooth, and the almost unavoidable straining and perhaps laceration of the soft tissues will excite in the gingival mucous membrane a state of inflammation which very often spreads, involving parts or all of the floor of the mouth, and perhaps the buccal or lingual mucous membrane, according to the location of the tooth or teeth that were extracted.

These cases may eventually become the seat of microbic influence if allowed to go on without proper therapeutic attention. Their treatment is simple and is generally followed by very satisfactory results. The first step should consist in thoroughly curetting the alveolus, thus removing all disorganized tissue, coagulated blood, and alveolar débris, if any be present. The alveolus is then copiously irrigated with hot water, and after drying with cotton an application is made of two drops of pure carbolic acid, and the alveolus is then loosely packed with sterilized gauze. If the pain does not subside, an application should be made of campho-phénique and morphin acetate. A small pellet of cotton is saturated with the campho-phénique, and,

after taking up with it a small amount of morphin acetate, is carried to the bottom of the painful alveolus. The morphin-campho-phénique dressing produces most remarkable results in the sense that the pain disappears almost simultaneously with the introduction of the dressing. When inflammation is not very severe, tincture of calendula may be used instead of carbolic acid. The author favors this agent for the reason that it has the power of subduing inflammatory conditions, with the additional property of stimulating the growth of healthy granulations. It has also been recommended to cauterize the alveolus with the electro or thermo-cautery. In one case which came under the writer's observation, temporary relief was secured by the administration of analgin in doses of gr. v every three hours. There are many other agents which may be used in place of analgin, but we give the preference to this compound because it apparently has no depressing action upon the heart.

Analgin is a coal-tar derivative, and chemically speaking is an acetyl-amido-benzol-trimethyl-xanthin. In addition, each dose contains sodium bicarbonate, gr. $\frac{1}{4}$; camphor monobromate, gr. $\frac{1}{4}$; extract hyoscyamus, gr. $\frac{1}{8}$; extract cannabis indica, gr. $\frac{1}{8}$. The hyoscyamus increases the analgesic properties, the camphor acts as a diffusive stimulant, and the cannabis indica is an antispasmodic.

Group 9. The treatment of general phenomena of infectious origin consequent upon tooth-extraction necessitates the exercise of great care and constant attention on the part of the attending physician or dentist. The treatment of this type of infections does not vary in the least from that indicated in infections consequent upon the contamination of other external wounds, except in that it is a much more difficult matter to keep surgically clean an area constantly bathed by a fluid abounding with bacteria both saprophytic and pathogenic. Treatment should consist primarily in the disinfection of the alveolus and neighboring areas with strong antiseptic solutions. Either mercury bichlorid solution 1:2500 or carbolic acid solution 5:100 is a valuable agent for the purpose. The constitutional manifestations should be treated symptomatically. If there be any signs of cardiac depression, tincture of digitalis and strychnin sulfate should be given simultaneously. The tincture of digitalis in doses of 5 to 10 drops, and the strychnin in doses of gr. 1/30 every three hours. Here, as in the case of every other systemic disturbance of a serious nature, careful nursing, hygienic surroundings, and nutritious food to sustain the patient's strength, are factors of the first importance.

Under this division of our subject, it becomes imperative to devote some words to the possibilities of the transmission of syphilis through dentists' instruments. Dr. R. A. McDonnell, in a paper published in the Dental Cosmos (vol. xlv, p. 556) mentions several instances of extra-genital chancres traceable to wounds inflicted by dentists. A chancre of the gum, a chancre inside the cheek, and a chancre at the angle of the lips came under his observation. Dr. McDonnell does not describe the circumstances under which these infections occurred, but his experience is sufficiently indicative of the dangerous consequences of operative intervention with septic instruments. A case of syphilis transmitted by a dental forceps was reported some time ago by Dr. S. S. Cartwright, in the *Medical Record,* and the many other cases which are to be found in medical and dental periodical literature emphasize once more the tremendous risk to which our patients are subjected when operated upon with instruments improperly sterilized.

Group 10. The limitations of time and space applying to the present paper make it necessary to condense the discussion of this group of reflex manifestations to only a word upon that type of cephalalgia which so frequently develops consequent upon the stretching and severing of the nerve filaments supplying the teeth and their alveoli. The irritation thus set up manifests itself in the form of dull headache lasting for one or more days. The therapeutic interven-

tion should consist in the administration of a nervous sedative—aconite in one-drop doses every hour, limiting the total administration to four drops. And here, again, analgin has given the writer most satisfactory results, arresting the pain almost magically, ten or fifteen minutes after its administration.

Group 11—Hemorrhage. This post-operative accident is perhaps the one which has received the greatest degree of attention from investigators and clinicians. When it takes place in comparatively normal individuals it is promptly arrested by such well-known agents as tannin, alum, or the iron salts, in conjunction with packings of gauze, cotton, or modeling composition, and in some cases the extracted tooth itself, as nothing could fit the alveolus more accurately. But we may unsuccessfully exhaust all means at our command in those cases of hemorrhage following the extraction of teeth in the hemophilic. Out of thirty-nine fatal cases of hemorrhage following various operations collected by Grandidier, ten were consequent upon the extraction of teeth. This is a proportion far greater than that from any other operation. In a work by Moreau, published in 1873, we find a total of twenty-six fatal cases following the extraction of teeth in individuals of the hemophilic diathesis. Hemophilia—an hereditary diathesis—is an abnormal state characterized by a marked tendency to hemorrhage owing to a diminished resistance of the walls of the bloodvessels, and to an insufficient degree of coagulability in the blood (Guerini). The treatment should consist in the administration of agents which will cause the bloodvessels to assume a condition of tone, and which will decrease the period of coagulability of the blood.

The first desideratum may be accomplished by the administration of the following preparation:

℞—Vini ergotæ, U. S. P., f℥iv.
Sig.—One teaspoonful every two hours.

The second requirement may be gained by the internal administration of calcium chlorid in doses of gr. x to xx. Wallis (*Journal of the British Dental Association,* August 1902) reports two cases treated successfully with this calcium compound, and Morley (*Trans. Odontological Society of Great Britain,* May 1903) reports one case treated by large doses of calcium chlorid internally and adrenalin locally.

Viau recommends as a local application the following styptic collodion:

℞—Collodii,	℥iij;
Acid. carbolici,	3ij;
Acid. tannici,	3j;
Acid. benzoici,	3j.

Sig.—Apply within the alveolus.

Boggs (*Deut. Arch. f. klin. Med.,* No. 79, 1904), who has experimented with the calcium salts, has substituted calcium lactate for calcium chlorid. It has the same effect on the coagulation time, is tasteless, and is well borne. In one case it reduced the coagulation time from 5 min. to 3.2 min., and in another from 6.7 min. to 3.7 min.

Discussion.

Dr. James Truman, Philadelphia, Pa. This is one of the subjects in which I think dentistry of today is very much lacking. From the earliest period in my experience, dentists have been in the habit of assuming that the fluids of the mouth produce immunity; that they are in a sense aseptic; that we can do anything in the way of injury to the tissue of the oral cavity without bad results. That was the teaching of forty or fifty years ago. We have fortunately outgrown that, and yet I do not know why it is that in the majority of cases there is a practical immunity in injuries of the mucous tissues. In the works of Metchnikoff and of Hugenschmidt of Paris certain theories have been evolved which have only in part been demonstrated, but others have taken up the study. Yet it is not demonstrated why we can do all sorts of things in the mouth and nothing serious result. This, however, is not always the case, and there has come a feeling that there is universal danger in the treatment of all conditions of the

mouth. With this, of course, you are perfectly familiar and it is like going over the A B C of dentistry to say that it is necessary to sterilize the instruments.

I remember one case that was very instructive to me—that of a lady who came to the clinic of the institution with which I am connected, and in whom I suspected syphilitic infection. She had a beautiful set of teeth. Upon inquiring into the history of the case, she informed me that she had been under the care of a certain dentist in another state whose reputation for cleanliness was not very high. She had had a bicuspid root removed. From that moment she was a sufferer, and when I examined it I pronounced it a case of necrosis, and there was nothing to expect but the final removal by extraction of the entire set of teeth. Consulting with her medical adviser, I learned there was no syphilitic taint in the family, and that if she had it the affection must have been acquired. It was a case of infection. I make it a rule in pathological treatment at the University of Pennsylvania to avoid, if possible, working on syphilitic patients, and if this cannot be avoided all instruments used must be sterilized by fire before using them again.

Another point in connection with this that I do not think has been given sufficient importance is the use of clamps and ligatures in the mouth. It is a well-known fact among dentists that before the introduction of clamps and ligatures there was little or nothing known of what is now called pyorrhea alveolaris. After the introduction of these very important instruments—and I would say no word against them—there was an increase of gingival inflammations—an increase, I think, that must have had its origin in microbic poison introduced through the wounds caused by these instruments. A dentist uses a clamp or ligature, and he takes it off and allows the patient to depart. He has produced a positive injury to the gingival border, and inflammations of the mouth inviting the development of micro-organisms. In forty-eight hours you will have an inflammation of the periosteum. That is the local beginning of pyorrhea alveolaris.

The essayist has described extraction of the teeth and treatment of the socket. That is another thing in which I think dentists have been lacking in their treatment. I include myself, for in former years I think I never used anything but a little warm water for the removal of the coagulated blood. We do not hear much about extraction today, and the forceps of the past are rusting in the drawers. In extraction there always exists the danger of septicemia. If it has never occurred in your practice, it has occurred in the practice of a number of others, and we should be on our guard. The causes that originate septicemia are always present after the extraction of a tooth with an abscess. It is a matter of constant surprise that this result does not more often occur.

Dr. Florestan Aguilar, Madrid, Spain. It gives me great pleasure to take part in the discussion of the paper of Dr. Endelman, which I think bears on a very important subject of daily practice. I am only surprised to see in the statistics collected by the essayist the small number of fatal cases recorded resulting from accidents following the extraction of teeth. I myself recollect a case which occurred a few months ago to a fellow practitioner in Madrid, who in trying to divide the roots of a molar with a circular saw to extract them, injured the tongue, and the patient was subjected to a very abundant bleeding. The dentist, in his effort to stop the hemorrhage, used some hemostatis pincers which were not clean, and the result was that infection occurred from which the patient died two days later from septicemia. This case has been recorded in the dental journals.

As Dr. Truman has said, it is of great importance to prevent the possibility of septicemia. I might add that the facilities for infection are great, not only to the patient but to the operator. Dr. Amoëdo of Paris was prevented from coming to this meeting of the congress on account of injury to his eyes from the

entry of a piece of tartar in the process of cleaning some teeth. We have record also of a case of septicemia causing the death of a dentist of Berlin who wounded his finger while performing an extraction, with the result that he had to have the arm amputated—but unfortunately too late to relieve him, and he died. I hope in the discussion of this paper we may lay down facts that may impress the general practitioner with the importance of thorough cleanliness of the instruments.

Dr. J. D. Patterson, Kansas City, Mo. While it is true that the mouth in its normal state is able to take care of all sorts of poisonous micro-organisms that may be present in the oral cavity, we sometimes puncture and injure the mucous membrane, and then certainly the most extreme care should be taken. In the operations for the removal of calcareous deposits, in the application of ligatures, in extractions, in all oral operations for the removal of tumors, and in all pathological conditions in the mouth we should take the most extreme care. We may have gone through life practicing for years without accidents, but they are liable to occur to us. We think we are immune from such experience, but the accident may come tomorrow. The accident of infection Dr. Endelman mentions is one of the worst.

Dr. Louis Ottofy, Manila, P. I. I was very much interested in the valuable paper of Dr. Endelman, and am pleased that I was present to hear it. In tropical climates the subject treated in the paper is of even greater importance than in temperate zones. I have seen a large number of cases of post-extraction infection, from my own hands and from the hands of others. A patient will return in a day or two and complain of constant pain, the wound will be found badly infected, and it requires from six to eight days to obtain relief. The inflammation often extends to the adjoining teeth, and often results in the destruction of considerable tissue. The full extent of discomfort thus caused is not generally known, for patients will go from one dentist to another in the hope of getting relief. This predisposition to infection in the tropics is especially marked in foreigners during the first few years of their residence, while the processes of acclimation are in progress and the system is especially liable to be readily affected. I have seen unfavorable results follow even when I have personally disinfected the instruments used, and when I have availed myself of all the ordinary precautions. It is now my practice to cleanse with a germicide the tissues liable to be injured, to see to the thorough cleanliness of all instruments, and subsequently to cleanse the wound with a solution of mercury bichlorid and also provide the patient with a suitable mouth-wash to be used for several days.

I was especially interested in the various formulæ presented by Dr. Endelman, and shall make use of them on my return to the Philippines.

Dr. T. W. Pritchett, Whitehall, Ill. I do not know if I quite followed the suggestion made as to antiseptic care after all cases of extraction. I think to anticipate all risks and dangers there should be very ample precautionary measures used at the time the wound is made, and particularly with respect to teeth with abscesses, where pus has already formed. When I extract a tooth or teeth I use carbolized hot water, and if there be no abscess developed I take less care than where there is pus. I use carbolized hot water freely, and then if there is a suspicion of pus I flush the socket with a 1 per cent. solution of potassium permanganate or a 10 per cent. solution of chinosol. I wish to ask if that is a safe antiseptic precaution for everyday use. I use carbolized hot water to sterilize the mouth before the extraction as well as after.

Dr. C. W. Rodgers, Boston, Mass. In looking over my library some years ago, I found a paper written about thirty years ago by Dr. Shepard of Boston. In it he made a plea for the dental office as a continual school for dental education, and I think that is one method we have for overcoming the septic condition often following the extraction of teeth. Thorough instruction should be given to the

patient as to the proper care of a wound after extraction. The general surgeon who has a case of adenia will in most instances insist that the patient remain in the hospital at least a week, and yet the extraction of a badly abscessed tooth, surrounded by diseased tissues, is of greater danger to the welfare of the patient. We should educate our patients as to the serious results that may occur; if we will make a point of instructing our patients, they will tell others.

Dr. L. A. MEYER, Oconomowoc, Wis. I am glad that I came into this section this afternoon. This question is one that has troubled me for fifteen years. Whenever a patient presents himself with a serious look on his face and a swollen jaw, I become at once troubled and ask myself, Shall I extract that tooth or wait? My practice is to cleanse the mouth thoroughly with hot water and an antiseptic solution. If I am satisfied that pus is present, I lance and try to get it out of the tissues. Then I consider the wisdom of extracting the tooth. After extracting I thoroughly cleanse again with hot water and antiseptic solutions, and then place a drop of lysol on a tampon of cotton in the socket. In severe cases I have left this tampon in the socket for a day. I then examine and again wash out the wound, and then dismiss the case or may repeat the same treatment. Often patients come to me for extractions whom other practitioners have refused. I invariably follow these instructions and am careful both before and after extracting. I had one case of a patient with an infected first molar; inflammation of the periosteum had set in and the soft tissues around the mandible were swollen and hard. The tooth was loose and it required no effort to remove it. I used an ichthyol tampon in the socket and dismissed the patient. I was asked next day to visit the patient at his house, and as no improvement had taken place I irrigated the wound with carbolized hot water for about twenty minutes, and the tissues became quite soft under this treatment. I prescribed a saline cathartic, and placed the ichthyol tampon, but the tissues still continued hard. A physician friend of mine treated this case for about three weeks. At first he thought we would have to remove a part of the mandible. The physician called my attention to the fact that there was a history of tuberculosis in the family. I did not think I was to blame in this case. I have been in the habit of taking out these teeth in the early stages of inflammation. Hot water and camphorated phenol or a lysol tampon seem to allay the pain in these cases. I want to thank Dr. Endelman and the others for the suggestions made.

Dr. ENDELMAN (closing the discussion). As to my statistics, I desire to say that they are by no means complete. They merely embrace a number of reports published at different times in the DENTAL COSMOS. I took these as a basis upon which to work, and I think they plainly show the dangers that may follow the use of unclean instruments.

I did not intend in my paper to discuss the treatment that should precede the extraction of teeth, as its primary object was to discuss the accidents of extraction, not pre-extraction treatment. I thoroughly agree as to the necessity of sterilizing the mouth before extracting or before any other surgical operation. Regarding carbolized water, I do not consider it sufficiently strong for that purpose. It may be sufficiently strong to make the surroundings unfavorable to the growth of microorganisms, but it will not destroy all the germs already present. I prefer something of the oxidizing type, like potassium permanganate, or H_2O_2, although for obvious reasons I am opposed to the injection of hydrogen dioxid into the alveoli of extracted teeth.

I also heartily approve of examining the patient a day or two after the operation is performed. It seems to me that if we neglect to do so we are not doing the best we can for our patients. To perform an operation and then abandon the patient to the mercies of chance is neither scientific nor professional.

As to the extraction of teeth the seat of abscesses, I feel that it is a part of surgical procedure, and whether an ab-

scess be in the mouth, in the intestinal tract, or in any part of the body, the cause must first be removed. If we discover that an abscess cannot be eradicated, the next best thing we can do is to remove the affected tooth. I stated in my paper that very severe pain is often felt after the removal of a tooth thus affected, frequently because the abscess sac remains within the alveolus even after the removal of the tooth. Due attention should be given to the alveoli after extraction.

I am absolutely opposed to the use of ichthyol. It is an unpleasant preparation made from fossilizing fishes as found in different parts of the world, and its taste is extremely unpleasant.

The subject was passed, and the Chairman announced as the next paper that by Dr. Louis Ottofy, Manila, P. I., on "International Examination and Tabulation of the Condition of the Teeth of Public School Children." (This paper, with the various tables and forms illustrating it, will be printed in full in the forthcoming Transactions of the Fourth International Dental Congress.) A brief *résumé* here follows:

Teeth of School Children: International Dental Examinations.

I.

Report of Examination of the Teeth of Filipinos and Chinese in the Public Schools of Manila, P. I.

In this, as he believes, the first extensive examination of the teeth of other than Caucasian children, the examiner found practically the same conditions as were shown by the examination of the teeth of children in various parts of the United States, in 1882-85. In the 250 girls and 250 boys examined in the public schools of Manila, the total number of teeth present was 12,453. Of the 6186 teeth of boys, 4670 were sound, 1516 carious; of the 6267 teeth of girls, 4298 were sound, 1969 carious—an average of carious teeth in males, 24.50 per cent.; in females, 31.40 per cent.; in both sexes, 27.95. This is a somewhat larger average than for European and Americans. None of the 250 boys had received any dental attention, and only one girl. In Tables I and II are given the details of the condition of all the teeth in males and females respectively. Table III gives the percentage of sound and carious teeth at the various ages for males and females respectively. Table IV, giving a general summary of the condition of all the teeth, exhibits a comparison between those of males and females.

The average number of teeth present in each child was 24.9; while in white American and European children the essayist has found it a little less than 23. Many teeth, however, are allowed to remain in the mouths of Filipino children which among ourselves would be extracted.

Only 13 of the 250 boys had every tooth sound; of the 250 girls only 11 had every tooth sound, or ½ of 1 per cent.

Of malformations, etc., only two kinds were found, viz, fusion of the deciduous lateral incisor and canine (invariably the lower), and supernumeraries (invariably in the upper incisal region).

In another examination—of 50 boys, all of pure Chinese parentage—the condition of the teeth was better than that found in Europeans, Americans, or Filipinos, being as follows: Sound teeth, 78 per cent.; carious, 22 per cent.

II.

Plan for a Uniform Periodical Notation of the Condition of the Teeth of School Children in All Countries.

In this portion of his paper the essayist introduces sundry forms and diagrams designed to carry out the purpose in view—an illustration of the use of some of them having already been afforded in his tabulation of the condition of the Filipino school children. The annual examinations he here recommends would show—(1) Comparative condition of the teeth of children in various countries. (2) Comparative improvement or degeneration from year to year. (3) The number of fillings—showing by comparison

the benefits derived from year to year, from additional care.

Dr. Ottofy gives details of his experience as to the time consumed in making such examinations with their tabulation.

The forms accompanying the paper comprise—(1) Form of blank showing scope of the examination he conducted twenty-two years ago. (2) Form of blank proposed for international examinations. (3) Form of tally sheet—facsimile of that used in examination of the teeth of the 500 Filipino children. (4) Form for final report—facsimile of that employed for the Filipino report.

The essayist concludes with the suggestion that the section recommend to the congress the appointment of a committee on this subject—to hold over and report to the Fifth International Dental Congress.

The next order of business was the reading of another paper by Dr. Louis Ottofy, Manila, P. I., on "Oil of Ylang-ylang as a Dental Remedy." (Printed in full at page 314 of the present issue of the Cosmos.)

The next paper announced by the Chairman was by Dr. H. L. Ambler, Cleveland, Ohio, on "Care of the Teeth of the Poor," as follows:

Care of the Teeth of the Poor.

The care of the teeth of the poor naturally begins with teaching them prophylaxis, and they must be made to understand that they can prevent some diseases of the mouth and lessen caries of the teeth. In order that the greatest benefit may be derived from dental hygiene it should be instilled into their minds somewhat as the A B C of rudimentary education—going over and over the subject until it is comprehended. Talking alone will not suffice; it should be demonstrated in our public schools by trained teachers or scientists, who should exhibit a good form of toothbrush and show the children how to use it; this demonstration should also include the use of toothpicks, floss in its several forms as found in the market, and narrow strips cut from rubber dam, which is much better and cheaper than rubber bands.

Filo silk is cheaper and stronger than floss, and it can be separated into one or more soft strands which may be waxed and used to clean the approximal surfaces of the teeth; by dividing it as above stated it can be made to pass between any teeth no matter how close together they may be. The writer has used it exclusively for thirty years when adjusting rubber dam, etc. It should be often and emphatically explained why it is important to cleanse the approximal surfaces. Every good thing has to be repeated before the public will believe it. The most simple and inexpensive dentifrices both liquid and solid should be mentioned, together with the method and frequency of using them.

"If the mouths of children in public schools could be examined by competent dentists, carious or diseased teeth filled or extracted, and instructions given and enforced with regard to the intelligent use of brushes and antiseptics, the death-rate of this country would be very materially lessened, the percentage of illness much reduced, and a stronger and more vigorous race result."

It seems as though it were the aim of those in charge of the public schools to teach nearly everything but dental hygiene. For example, there has been established in a very few cities in the United States a department of "physical education," where the teachers devote their time to the building up of undeveloped pupils and systematic training of children actually in need of physical education. No doubt it can be shown that one cause of non-development is dental and oral disease; it follows, then, that to be successful these teachers need the assistance of the dentist.

Those who cannot be coaxed into caring for their teeth can often be driven to do so by telling them that most mouths contain myriads of micro-organisms, and that some of these micro-organisms produce caries of the teeth, besides diseases of the mouth and intestinal tract; also that particles of food in and

around the teeth degenerate into fermenting and putrefying substances and gases which injure the teeth and general health and form a suitable pabulum for the development and multiplication of micro-organisms. These facts should be dwelt upon by those attending the sick poor, who may be thus induced to cleanse their mouths.

In Cleveland, Ohio, the eye inspector in the public schools is appointed by the superintendent of public instruction at a salary of two thousand dollars per year, and his duties employ all his time in examination and treatment—in fact, he is obliged to send many cases for free treatment to the dispensaries. Occasionally some benevolent person gives him money to purchase glasses for the poor, and in other cases he informs the superintendent of the city infirmary that such a child needs glasses, and if the parents are too poor to buy them the superintendent has the matter investigated, and if the parents are found to be worthy poor he gives an order on an optician for the needed glasses, which are paid for out of public money. Taking it for granted that this is the proper thing to do, why cannot poor children have their teeth cared for on a similar plan?

We must reach the parent through the child, the child through the teacher, and the teacher through a dentist paid by the municipality, or else through a text-book on physiology—and so far as the writer is aware these text-books are entirely inadequate. True, some of them are better than those of twenty years ago, but there is a great chance for improvement, and boards of health, school boards, and publishers who have the good of the commonwealth at heart should see that this matter is righted. In the physiology used at the great Chautauqua Assembly only four pages are devoted to the teeth.

The Cleveland (Ohio) Dental Society, through its committee on hygiene and with the co-operation of Superintendent Jones, succeeded in getting a few changes and additions made to the chapter on teeth in the physiology used in the public schools of the city.

In order to prove the dearth of matter pertaining to the teeth, the writer examined ninety-eight works on physiology, hygiene, and kindred subjects, and found that thirty-five contained nothing, sixty-three contained one hundred and three pages—an average of one and two-thirds pages per book. To the dental mind comments are unnecessary; but it would be well to publish these facts broadcast.

Medical inspection of schools is in force in fifteen cities of the United States, and dental inspection is sure to follow, as each will be of great assistance to the other, and a large number of poor can be reached in this manner. The dental inspector might be appointed by the board of health, the superintendent of schools, or the board of education. He should report twice during each school year, and also receive pay for his time as do medical inspectors. School could begin a few minutes earlier on certain days until all pupils had been examined, and then, if the inspector were not authorized to send poor children to a dentist paid by the municipality, as is the case in some places abroad, a card might be sent to parent or guardian stating the treatment needed.

The municipality of Strasburg, Germany, has resolved to build at a cost of eight thousand dollars a dental hospital for the exclusive use of school children. Every child must be subjected to a dental examination on entering school, and twice every school year until the age of thirteen.

In many children development is interfered with by the diseased condition of the teeth, and furthermore when they suffer from toothache they cannot study and often prevent others from doing so. Dr. McCoy says, "In a school of seven hundred pupils, of 500 between ten and eighteen years of age, 50 cleaned their teeth twice a day, 275 used a brush occasionally, and 175 did not own a brush; of 200 in the primary department from six to ten years of age, not more than 10 used a brush." This gives a good idea of this open field for inspection and instruction.

A child will often bear toothache for days before saying anything about it, be-

cause he is afraid he will be sent to the dentist. Eventually he becomes incapacitated for school work before attracting the attention of the parents.

Dental hygiene has an economic value also, and if we can get poor people to understand the matter, and can contrive a means of notifying them early and officially that their children need dental services, they may be able to obtain such service free; and if not free, at but a small cost, thus leaving a small balance to be spent for something else. It is high time conservation of the teeth were attended to, as the manufacturers of artificial teeth claim their sales are increasing every year, and it is probably true that the enduring quality of the human dental apparatus in the United States has become progressively less from generation to generation. In 1900 the United States had over 26,000,000 of children of school age—between five and twenty years; over 15,000,000 of these attend school, so that there is more than plenty of work for dental inspectors. It has been estimated that 10 per cent. of public school children cannot compete with their robust mates owing to some form of disability, a portion of which is necessarily dental. During one year in Philadelphia over 5000 pupils were found requiring medical attention, and there can be no doubt that many of them were made sick through the existence of some kind of dental trouble.

Competent observers say that there exists a more or less marked ratio between the physical soundness and mental acuteness of the child and the condition of the teeth. Where inspection has been in force it has proved to be an educator of both children and parents, and has attracted the attention of school boards and health boards, in localities where there is no inspection, to the importance of oral and dental hygiene. A child who is well will learn faster and behave better than one who is ill; thus it naturally follows that the teacher has an easier task.

Inspection is a direct practical and economic method, and it must be admitted that correction of oral and dental lesions means days at school which would be lost from toothache and its many reflexes, such as ear-ache, eye-ache, headache, etc., and an eminent neurologist has said that "Even decayed teeth may set up nervousness of a visceral type usually erroneously considered temperamental."

If each child in the United States between five and twenty years of age loses one hour during the school year, at the end of the year there will have been lost more than 14,000 school years. Is it not reasonable to presume that 3 or 4 per cent. of this time has been lost on account of dental lesions? In a city of 50,000 school children, reports show that during one week in February 4000 were out of school on one or more days on account of some kind of sickness.

Boston, Mass., has about fifty medical inspectors, and they have formed an inspectors' association which is presided over by the chairman of the board of health, and from time to time they listen to addresses by specialists on diseases of the eye, ear, nose, throat, etc., in addition to their other work. When we have dental inspectors, they might adopt a similar plan. In Paris, France, both medical and sanitary inspection are obligatory in public and private schools, and by virtue of an act of the municipal council the pupils of the public schools have their teeth examined every six months, and many of these children obtain free services at the dental colleges. Hygiene is considered of so much importance that Durham College of Medicine, England, proposes to confer the degree of Bachelor of Hygiene—B.Hy.—instead of the diploma in public health.

A movement is on foot to introduce into the Canadian public schools regular dental inspection of the teeth of all pupils, because the fact is recognized there that diseases of the teeth produce both moral and physical degeneracy.

Poor people always neglect their teeth and thus have caries, with pain, and finally have the teeth extracted; they also have more accidents, such as falls, blows, sickness, etc. They especially are ignorant about the teeth, and one means of education would be to distribute

among them booklets (through the children) giving instructions about caring for teeth and using simple remedies and methods. They should know that bad teeth often cause bad digestion, bad digestion causes a craving for liquor, and liquor causes crime. They should know also that teeth are as valuable as ears, noses, fingers, etc.

It has been said that there was less effort to care for the teeth of the poor in the United States than in England or on the Continent. About 90 per cent. of the children of the poorer classes in the United States have diseased teeth, and Dr. Pedley reports about 75 per cent. in England. In Germany 20,000 children from six to fifteen years of age were examined, and it was found that 95 per cent. of them had dental caries. Dr. Ottofy inspected the teeth of 500 Filipino school children and concluded that their teeth do not differ materially in structure from the teeth of American, German, French, British, Swedish, or other school children of the Caucasian race. The number of school children abroad whose teeth have been examined is about 23,000, which far exceeds what has been done in the United States. Dr. Hopkins says: "It is not too much to say that 30 per cent. of all teeth of children between the ages of five and fifteen in the public schools of the United States are diseased."

In order to convince the proper authorities that dental inspection is desirable, you must have plain facts accompanied by statistics to lay before them.

In 1900 the National Dental Association appointed a committee to consider the expediency of inaugurating steps looking to the co-operation of the public schools in teaching "Good teeth—good health." This committee undertook to gather statistics about dental caries and other abnormal conditions, such as harelip, cleft palate, V-shaped jaw, irregularities, etc. The circular sent out says: "We want children instructed in the care of the teeth and mouth—taught some system of oral hygiene. Young minds are very susceptible, and they would readily understand, if properly taught, the serious results liable to follow the neglect of their mouths and teeth. The results would be of scientific and economic value, and if you will make a systematic examination of the teeth of school children from six to fifteen years of age, blanks and diagrams will be sent at the expense of the National Dental Association." The work to be done by the examiners was to be purely philanthropic and scientific in obtaining statistics which would be of great value to the profession and public.

At the above time this movement was general in the United States and Europe. We believe that the schools in Brooklyn, N. Y., were among the first to be inspected. The mere fact that professional men were doing the work, and were doing it unselfishly, would bring the parents to appreciate the difference between professional and unprofessional dentists.

In order to introduce instruction in oral hygiene into our public schools, Dr. E. E. Haverstick of St. Louis says: "It will be necessary to amend Section No. 9958 of the Session Act of Missouri of 1901. This section relates to the branches in which teachers must pass an examination for their license to teach in the public schools. The amendment should make the law so strong on this point that a teacher who does not understand the laws of oral hygiene, and who does not know the ill results of the too early extraction or the too long retention of the temporary teeth, and who does not know that the first permanent molar belongs to the second set of teeth, and how important it is to save it, would not be permitted to enter the schoolroom to instruct children. The teacher should know the time of eruption of the permanent teeth, the anatomy of the teeth, the results from the death of an unattended tooth-pulp, that devitalized teeth often cause swellings, also how to clean the teeth, and such general things as these."

Teachers should be required to examine the teeth of their pupils as to cleanliness and soundness every week. Such a law would force all schools which prepare teachers to introduce into their instruction a course in oral hygiene and

anatomy, and this would create chairs in these schools which could be filled by doctors of dental surgery only. The idea is that better results can be obtained from examinations made by trained teachers than when made by dentists, as the teachers would examine more often, they would have more influence and watch more closely.

Dr. J. P. Corley says: "Every state society should have a standing committee, one duty of which would be to memorialize its own state educational and medical associations, and to insist that every medical college within its bounds should attach to its teaching corps a lecturer on oral hygiene and dental prophylaxis, and that all public and normal schools have some systematic instruction on the subject."

The National Dental Association at the Asheville meeting passed the following resolution: "That it is the sense of this meeting that each medical college in the United States should include in its curriculum a lectureship on oral hygiene, prophylaxis, and dental pathology." It seems to be a plain proposition that the medical colleges through their graduates, instructed in above studies, might become potent factors in caring for some of the diseased teeth of the poor. In 1825 Dr. H. H. Hayden of Baltimore, Md., delivered to the medical students of the University of Maryland some lectures on dental physiology and pathology. The medical department of Washington University, St. Louis, Mo., added a dentist to the teaching staff in 1864, and in 1868 the Homeopathic College in Cleveland, Ohio, did the same; since that time the writer has made a record of seventeen more in the United States. The report of the Commissioner of Education for December 1902 shows that there were in the United States 154 institutions granting medical degrees, with 26,821 students in attendance. Johns Hopkins University, Baltimore, Md., does not admit young women to prepare for trained nurses unless their mouths and teeth are in a healthy condition.

In the Dental Cosmos for January 1904, Dr. W. H. Potter gave a description of the establishment of free dental service for the sick poor at their homes, by the Harvard School, Boston, Mass., in 1897. The service was simply for the relief of pain, and was carried on by a special corps of the best students, who were given bedside clinics. These attendants did not fill teeth or make artificial dentures, but carried four pairs of forceps, dressing pliers, explorer, three excavators, two chisels, drill, broach, lance, syringe, mouth-mirror, carbolic acid, oil of cloves and chloroform equal parts, aconite, iodin, and chloroform equal parts, aseptic cotton, and sandarac varnish.

Tufts College Dental School, Boston, Mass., is working along the line indicated above, but they find that they are handicapped because there are so few men in the senior class who have passed their state board examinations. If students could go out under the direction of the chief demonstrator of the operative department the work could be greatly enlarged, and homes for old men and women, orphans, and other charitable institutions could be visited. The state makes no provision for the care of the teeth of the inmates of asylums, etc.; all the attention they receive is in the line of extracting by the house officers. For the last two years there has been a bill before the legislature in Massachusetts providing for the appointment of dentists by the governor to attend to the people in charitable institutions. Quite a number of prominent practitioners have personally gone before the legislature and indorsed the bill, and there are still hopes that it may be passed. The managers of Tufts College sent out circulars to those whom they thought would be interested in the success of the dental department, inviting them to contribute to a worthy plan by which the charitable work of the department could be carried out and enlarged.

In the United States nearly all of the charitable dental work for the poor is done by the dental colleges at their clinics or by an "emergency corps," as formerly noticed, but they only reach a small portion of the needy; they do much

good, but only begin to care for the great number of suffering ones. Perhaps one-half of those who attend the clinics can pay a very small sum, and, so far as the writer is aware, none of the colleges turn away those who cannot pay; but the calls from the latter are increasing, and the consensus of opinion among college men is that a fund should be established the interest of which could be used to purchase material for operations that must be made gratuitously. In order to establish such a fund dentists must either by talking or writing attract the attention of the wealthy and benevolent, and persuade them to endow or give outright to dental college infirmaries such sums of money or other property as their wisdom dictates. They should be shown the advantage of these opportunities and the great good that can be done for the health and consequent happiness of the poor. In the United States the laity at large do not know that dental colleges are doing any charity work; they have always known that medical colleges and hospitals cared for the worthy, and often the unworthy, poor; but the idea that dentists at college would work without fees they regard as preposterous, because they have been led to think that dentists make money very easily and as a matter of course dental colleges are becoming wealthy, and the bare idea of contributing to their charity fund never cast a glimpse of a shadow across their minds.

A free dental clinic has recently been established at the New Haven, Conn., free dispensary. The equipment was furnished by the estate of Mr. F. H. Hooker. The clinics are held Tuesdays and Thursdays from two until four, and the operators are appointed by the director, Dr. E. S. Gaylord, six months in advance, and a number have promised to give their services four half-days each month for six months, to perform all operations except gold fillings, artificial dentures, and orthodontia. The card system has been adopted so that every operation can be referred to at any future time.

The Edinburgh (Scotland) Dental Hospital—college, as we call it—is considered a public charity, to which the city council gives five hundred dollars yearly; and in addition to this, subscription papers are circulated. In the waiting-room of the old Dental Hospital of London there was a large blackboard on which appeared the names and amounts of money donated by each person; this showed that it was largely supported by voluntary contributions. In a few years these amounted to over two hundred thousand dollars, with which they erected a new building. It is a common thing to solicit money for dental colleges, and nobody takes offense, as it has always been the custom, and there are many ladies who contribute. In some cases bequests are made in wills; in others there are annual subscribers both among the laity and profession. Governors and subscribers can issue tickets to the poor, viz, every poor applicant suffering pain to have gratuitous assistance, but necessitous persons requiring special operations to be admitted on the recommendation of a governor. Patients are often required to present a special application, in which it is certified by a clergyman, minister, or justice of the peace, that the applicant is in necessitous circumstances.

His Royal Highness the Duke of York, K.G., is president of the National Dental Hospital and College of London, and among the managers are many other titled gentlemen. Every donor to this hospital of one hundred dollars becomes a life governor, and is entitled to recommend twenty patients annually. Every donor of fifteen dollars annually becomes an annual governor, and entitled to the same privileges as the life governors. Every donor of fifty dollars becomes a life subscriber, and entitled to recommend ten patients annually. Every donor of ten dollars annually is entitled to recommend ten patients annually. Every donor of twenty-five dollars is entitled for life to recommend five patients annually. Every donor of five dollars annually is entitled to recommend five patients annually. Every executor, under direction in the will of a testator, who pays five hundred dollars or more shall be a life governor. Every clergyman who by a collection in his church obtains and

donates twenty-five dollars shall be entitled to recommend ten patients during that year; if he donates one hundred dollars he shall be an honorary governor for five years, and if he donates two hundred dollars he shall be an honorary governor for life. In the annual announcement is published a list of donors and subscribers with the amount subscribed opposite each name. The names of seventy ladies and a greater number of gentlemen appear in the list for 1898, and the amounts vary from five to two thousand dollars.

Guy's Hospital, London, has an endowment fund exceeding one million dollars, and connected with it is a dental school. Here patients are not obliged to obtain cards of admission, but the "chief of clinics" decides whether or not they are entitled to free services; if not, they pay various small fees. On the surgical and medical staff there are three dental surgeons, and accommodations are furnished for dental patients in one of the wards; probably this is also true of a few other hospitals. In Paris, dental services are provided for in some of the hospitals, where dental students under an instructor do more or less work. Among the oldest bequests in London charities is one which provides for the care of the teeth of 2800 poor people yearly. A few years ago a bequest was made to be used to pay for the care of the teeth of school children in a village of England, in cases in which the parents could not afford to meet the expense.

If all of the above facts were widely disseminated we believe that the municipal authorities and benevolent wealthy people of the United States would soon solve the problem of "the care of the teeth of the poor."

The idea was suggested, and tried, of having dentists not connected with colleges give a certain portion of their time to the worthy poor who cannot leave home; but so far as we know the movement has not grown much, because there is more or less apathy in the profession and it needs someone to take charge of the matter and make it known to the public in some way, and also headquarters where calls could be sent for services, with someone stationed there to notify the dentist who is on duty for that day; if he cannot go, then the one at headquarters should find a substitute. Most dentists are willing to do a certain amount of charity work, but when they find that their services are not appreciated they soon lose interest.

The board of directors in every general hospital should be thoroughly impressed with the fact that some of the inmates are suffering from dental lesions nearly all the time, and that it is their province to have them relieved just the same as if they were suffering from a lesion of any other part of the body. The way to accomplish it is to have a room in the hospital furnished with a dental chair and a case containing sufficient medicaments, materials, and instruments to treat oral and dental diseases and fill teeth with plastics; also included in this outfit should be forceps, etc., for extractions. One or more dentists should be formally appointed on the staff of every hospital and one or more beds should be assigned for serious dental cases; thus the dentist is placed in a proper light—on an equal footing with other medical men on the staff. No doubt the general practitioner and surgeon would often gladly send some of his perplexing cases to the dental surgeon.

The time is near at hand when all first-class hospitals will feel the necessity of, and adopt a system similar to that outlined above, in order to keep step with the progress of the times. The writer already has a record of twelve (probably there are more) large and small hospitals in the United States which have a dentist on the staff, and so far as he knows, Chicago leads in this respect. If the accommodations and conditions were such as outlined, there would be no difficulty in getting dentists to give a portion of their time to the care of the teeth of the poor in hospitals.

The laws of the different states should make it possible for the governor or the board of health to appoint, with salary affixed, a resident dentist for blind, deaf and dumb, epileptic, and insane asylums.

There are very few such appointments in the United States—perhaps six or eight would cover them all.

Every dentist is aware that people have become insane, and some of them kept so, from dental diseases, and in the case of epileptics very many have been greatly relieved by the dentist. A room in each asylum should be furnished, as above suggested, and the patients cared for by a dentist. Very little attention has been given to this method of caring for the teeth of the poor and helpless, because politics is the great absorbing theme, and the facts concerning dental lesions among the poor, and showing the necessity for remedial measures, have not been sufficiently and emphatically called to the attention of those having the appointing power.

Another way to care for the teeth of the poor is to interest the management of homes for orphans, old men, and old women, of boys' and girls' industrial homes, etc., which are dependent upon charity. By often sending them booklets on hygiene, etc., they will become interested, and finally will secure a dentist, or dentists, willing to do some charitable work by giving instruction or operating.

You must educate the poor in dental hygiene or they will neither care for their teeth, nor will they ask or even allow the dentist to do so; and a most potent power for getting at them is the daily press. Societies should choose members to write short intelligent non-technical articles, perhaps once a month, and, if thought best, these articles could be read before the society or submitted to the publishing committee before being printed without any signature. Another way of reaching the people is through popular magazines. A few years ago the *Cosmopolitan* offered a cash prize of two hundred dollars for the best article on "Care and Preservation of the Teeth"; a number of essays were sent in, the prize was awarded and paid, and the essay published. *How to Live,* for April 1904, presented an article on dental hygiene covering thirteen pages—three or four times as much as is contained in many text-books on physiology or hygiene. The article was rather unique and attracted the general reader, as it was illustrated.

In 1896 a manufacturing company at Yonkers, N. Y., undertook somewhat of an educational campaign by offering the sum of four hundred dollars, divided into four prizes, for the best original article on "Germicides and Antiseptics in Dentistry." The articles written by dentists were published and the prizes paid, and in the furthering of prophylaxis, etc., they accomplished much good. The Swedish Dental Society, Stockholm, offers $185 for the first prize, and $80 for the second prize, for the best essay on "The Teeth and Their Care." The essay is intended for free distribution among school children and the lower classes of people.

Discussion.

Dr. Louis Ottofy, Manila, P. I. This valuable contribution of Dr. Ambler agrees perfectly with what I advocated in the paper I read before this section, and furthermore the subject is ably supported by facts and statistics which will be of great value in securing dental services for the poor. The principal disadvantage has been that we had no facts to present, and those in authority cannot be made to fully understand the importance of the matter. I remember when I endeavored to secure permission to examine the school children's teeth in the public schools of Chicago, that it was some time before the authority was granted. It was impossible at that time to present data to convince the school authorities of the benefits that may be derived from this work.

Dr. C. W. Rodgers, Boston, Mass. A gentleman in Boston has been attending, without remuneration, to the teeth of the poor for the past seven years. Much illness prevailed before the establishment of the dental service, but the statistics now show that disease has decreased from year to year as the condition of the teeth improved. The proportion was probably as much as 500 per cent. in reduction. That is the kind of statistics we must have to present to boards of education. They will then

look on it in the light of a business proposition—that it will pay to have dentists connected with the public schools. I think if some such institution as this would take action, appoint a chairman in each city, and in each state a committee of oral hygiene with authority through the National Dental Association, it would not then be thought that dentists were actuated by selfish motives. Harvard University has an emergency corps, and they have certainly accomplished a great deal of good. I do not think the state boards would interfere in any way, or require certificates to do this work.

Dr. C. R. Taylor, Streator, Ill. It seems to me we can go about helping the worthy poor in institutions, etc., in an impersonal way. Let us organize where we have our local societies, and let us work free of charge in the hospitals of the community. It has been in my mind for the past few weeks to bring this before the Good Fellowship Club of Streator, and see if we cannot unite in this work. Bacon said that every man owes a duty to his profession. Yes, and also, I add, to the community in which he resides. If he contributes something with the idea of special benefit to himself, he has hardly reached the ideal. The longer I live, the more it seems to me the object of life is to be worthy of the esteem and gratitude of the people with whom I come in contact. It is not necessary for us to look for compensation—those things will come to us; let us be worthy.

Dr. Ambler (closing the discussion). I will simply say that I appreciate the kind words that the paper has received. It is not entirely original, but many of the ideas I have never seen published; they tell how to get at the matter practically and suggest what can be done.

The subject was passed and the section adjourned.

Third Day—Thursday, September 1.

The section was called to order at 2 o'clock Thursday, September 1, Dr. Peck in the chair.

After the reading of the minutes of the previous session by the secretary, Dr. Reid,

The Chairman announced the first order of business as a paper on "The Solvent Action of Saliva on Cements," by Dr. J. E. Hinkins, Chicago, Ill. (Printed in full in the present issue of the Cosmos, at page 322.)

Discussion.

Dr. A. W. Harlan, New York, N. Y. The length of this paper and the enormous tables that it contains preclude the possibility of taking it up as a whole, for the reason that it would require a great deal more time than I have been able to give it, although I have read it since I have been here. The conclusions, and the disagreement in the conclusions with the work of Drs. Kirk and Miller, it seems to me can be answered by Dr. Miller, who is present. One of the practical observations I would make in regard to the failure of cement through the solvent action of the saliva, is that cement is not put into the mouth at a uniform temperature nor with a definite time for solidifying, and we have different results with reference to the capacity of that cement to remain in the teeth. We must take into consideration the personal equation. One man puts a cement filling in a tooth without the rubber dam, and another has the dam in place. In one case it is removed as soon as the crystallization begins, and another man protects it with the rubber dam for hours to prevent various deleterious agents from coming into contact with it; and so, unless all the experiments are made with the same degree of accuracy, we are not able to determine positively the rôle the saliva plays in the destruction of cement. And furthermore, the attrition of mastication, and the movements of the jaws, due to intestinal troubles and nervous troubles, play quite an important part, which is not estimated, in the wearing down of the fillings. A man or woman fifty years of age, where the occlusion is bad, will have the teeth continually grinding and working, and will be making movements

with the tongue and lips which will cause an abnormal flow of acid saliva, and so we have a still further solution of the cement fillings. In consequence of my imperfect knowledge of chemistry I am not able to follow the whole paper, but the conclusions appear to be a decided step in advance, because previous to a few years ago no work in this line had been presented, and the work of Drs. Acree and Hinkins presented in Paris in 1900, and before the Odontological Society of New York, opened up the field of experiment; and I think the essayist should be complimented for the time and labor spent in order to present the subject in so concise and clear a manner, even though it be discovered during the process of the discussion that some of the points are not well taken.

Dr. W. D. Miller, Berlin, Germany. The paper of Dr. Hinkins shows an immense amount of thorough and careful study and experiment. I am struck with the idea that theories of dental caries are increasing nowadays with great rapidity. In recent years a theory has been advocated to the effect that the bacteria of the mouth produce a ferment analogous to trypsin, which acts upon tooth-structure in the presence of alkalis, and that in consequence acids are not necessary for the production of caries. More recently Lohmann came out with his theory that the mucin normally present in the saliva is the primary cause of caries. Now Dr. Hinkins offers us a theory to the effect that the physiological secretions of the body are in a condition to destroy structures of that body. As has already been pointed out by Birgfeld, this does not seem to me a logical conclusion. It would be surprising to me if nature had done so bad a job as to make herself destructive of her own body substance. It would be as though we held that the pepsin of the gastric juice destroyed the mucous lining of the stomach, etc. It seems to me that in the process of evolution a thing of this kind would have been done away with long ago. It is a question for experimentation to determine, and the question I would like to ask Dr. Hinkins is whether ptyalin really has the property in the mouth of producing acids by which it can attack the teeth. The experiments are very interesting, but as he says, they do not really prove that this process takes place in the mouth. I would suggest that saliva be filtered through a Chamberland filter in order to free it of bacteria, and then allow it to act on foodstuffs which have been sterilized, and see if he could produce acids. If so, it would be a step gained in the demonstration of this problem. Until then I should not consider the proposition as proved; but I do not wish to detract from the great value and interest of the experiments Dr. Hinkins has made.

Dr. Hinkins made a reference to my work on erosion to which I have no objection except that he did not exactly represent what I have put forth. He said that I bring forward again the mechanical theory. That is true, but I also said that it is possible there may be other substances besides acids which act to bring about erosion. I have hesitated to accept the acid theory, because authorities differ. We have such men as Preiswerk, Dill, and others who are in authority among us, and they claim that erosion is most frequent when the saliva has an alkaline reaction. If erosion be caused by acids, I cannot understand how it is that we have the bright, shining surface. You cannot produce a shining surface by the action of acids on tooth-substance. If you act upon enamel by an acid and brush it with a brush, the surface on drying will appear chalky. For this reason I have not quite been able to accept the theory of acid having a prominent part in the production of erosion. I would like to call the attention of Dr. Hinkins to the fact that many years ago some dentists in Germany stated that erosion was due to the destruction of the tooth-substance by a certain ferment in the mouth. Another point: I examined at one time the teeth in a large number of skulls in the Anatomical Museum of Berlin, and I found not a single case of erosion among all the skulls that were from uncivilized peoples who do not use a brush.

Dr. Kirk was criticized for not giving

Dr. Hinkins due credit. There must be some misunderstanding here, as we all know Dr. Kirk to be a just author, and I am sure if his attention were called to any oversight he would be the first to correct it. Regarding the crystallization of calcium lactate, etc., he showed me his preparations. Calcium lactate crystals and those that he had studied under the microscope were identical.

Dr. HINKINS. Can you draw a definite conclusion from the microscope? There is a difference between the dead cell prepared in the laboratory and the live cell. It is a higher form of cell life, which cannot be produced in the laboratory, but which exists in the human body.

Dr. MILLER. We were only determining a chemical substance. Dr. Kirk declared it to be calcium lactate, and I think he was right. In regard to the action of life and death, it would take us too long to discuss that question. One and the same cell may have two different actions and functions, one by virtue of the life that is in it and one by virtue of certain chemical substances which it produces. Take for example the phagocyte. Only the living phagocyte can find its way to the point where an invasion of bacteria has taken place, and only the living phagocyte can envelop the bacteria. The dead phagocyte, however, may prove just as fatal to bacteria, in that on breaking down it releases certain substances which have a high bactericidal power. I have looked into the action of potassium sulfocyanid upon the teeth and I have not found that a high percentage in the mouth is correspondent with extensive erosion. I would hesitate, therefore, before accepting that theory.

Dr. G. W. COOK, Chicago, Ill. I have been, of course, very familiar with the work of Dr. Hinkins as offered here in this paper, and not only this paper but previous ones, and I think both Dr. Hinkins and Dr. Miller have misunderstood the real import of this question. It is not so much as to whether the acid is in all instances the cause of the solution of cement and tooth-structure, but it is whether or not there is a diversion of the cell structure from which these secretions come and the extent to which they are reversible in their activity. They secrete a ptyalin easily converted into a fermentive substance itself. As to how far this physiological condition can carry on destruction is of course an important question. The absorption of the roots of teeth is a pathological process, but carried on by a physiological cell action around the tooth-root. The cells which cause this disintegration, in some instances, are diverted from their physiological function to that of destructiveness; they take on the function of eliminating certain tissues. Is it not possible that we might have an action that might destroy the tooth-substance? It might be neutral, but this has led to considerable speculation along these lines.

Some two years ago, Dr. Hinkins and his co-worker brought out the point that many of these enzymes would carry an acid reaction to a certain point, and when it reached a certain definite point it would revert and become alkaline, and in this you will find the great scale of variation of some of these organic forms. Is it not, then, possible that the physiological cells of the salivary glands, etc., might become diverted to the extent that there is not secured a perfect, normal ptyalin, and that there is a reversion or diversion into an acid or alkali without the presence of micro-organisms?

Dr. Miller said we might filter the saliva through a Chamberland filter and free it from micro-organisms, and see if it would then act on foodstuffs. We know that it would; these tests have been made, and by sterilization of the saliva you will find that fermentation will take place later on in certain forms of foodstuffs.

On some points of this paper I might disagree. It seldom happens that men who are working on certain lines closely agree about anything, but Dr. Hinkins lays some stress upon the xanthin, one of the products of nitrogenous decomposition, as being in the saliva. In a paper before another section I call attention to the fact that none of these productions are in the saliva. They have been found

in pathological conditions, but they are rare.

Dr. C. R. Taylor, Streator, Ill. I am not going to discuss this paper, but I would call attention to a fact in relation to the question raised by Professor Miller as to acids not producing a smooth and polished surface. On a lime surface it does take place under friction, as illustrated by those who polish monuments of limestone. They use oxalic acid to obtain a beautiful effect, and I do not see why the same effect might not result in the mouth. With friction, instead of leaving a roughened surface it will leave a polish. Monument-makers use a saturated solution. They moisten the crystals of oxalic acid and rub the marble with the solution, and under the friction the acid produces a beautiful polish.

Dr. E. C. Briggs, Boston, Mass. Dr. Taylor has said much of what I wanted to say, but in addition I wish to refer to what Professor Miller said concerning the alkalinity of saliva in mouths where there was erosion. He implied that that exploded the theory of acidity causing the erosion. Now if the mucous follicles above the incisors have become unduly active and secrete a great deal of acid, the fact that the saliva was strongly alkaline would only tend to increase the acid secretion. It is a well-established fact that all alkaline treatment directed against these acid-secreting glands only serves to increase their activity, in accordance with Anstie's law. I have obtained a great deal of improvement in cases of erosion by vigorous treatment of these glands with acids, protecting the teeth with celluloid in acetone solution.

Dr. J. D. Losada, Madrid, Spain. There was one point spoken of by Dr. Miller to the effect that he did not find erosion in a large number of skulls of uncivilized peoples who did not use the tooth-brush. It seems from this we must blame the tooth-brush for the erosion, because if those who do not use it never have it, it shows plainly that the tooth-brush is one of the factors in the causation of erosion. I agree with Dr. Miller that acids would leave a roughened surface, and I was surprised to hear one of the previous speakers say that acids were used in polishing limestone. You can drop acid on a stone of any kind and you will get a rough, but never a smooth surface. It seems to me the friction has much to do with it.

Dr. Hinkins (closing the discussion). I admire Dr. Miller exceedingly. I prepared this paper with the results of hard work, but Dr. Miller seems to have overlooked some points in my paper. For instance, he has dwelt considerably on alkaline saliva, creating the impression that I did not consider this phase in my paper. Dr. Miller overlooked that point. In my paper I say as follows: "These erosions we now believe to be due to the solvent action of the secretions of the mucous membranes and salivary glands of the mouth, when from constitutional causes these secretions become especially acid—or alkaline. It is very likely that there are certain lines of flow of the saliva in the mouth—channels through which the saliva flows most easily after excretion and during its movement in the mouth—and the erosion will naturally be more marked on those teeth situated in such places."

There might be special conditions under which the saliva may become alkaline. But I have never observed a case of an alkaline saliva, and I have tested the saliva of over one hundred and fifty people. Therefore I cannot base my statements on an alkaline saliva, but only on what I have found—namely, an acid saliva. We certainly have an acid condition, and the more the saliva is mixed with foodstuffs the more susceptible it is to fermentation and the increase of acidity. But it does not make any difference whether the saliva be acid or alkaline, it will act upon the cement.

Dr. Miller inquired if saliva which has been dialyzed or filtered through a Chamberland filter is still acid. I have made this experiment repeatedly, and found the acid condition to be still the same. I did not publish this in the paper, but left it broad, so that it could be discussed and I could go on and do more work. These conditions, let them be acid or alkaline, are liable to produce a solvent

condition of the cement. I cannot say that every case of decay of the teeth is caused by an acid or alkaline condition, but my analyses in over a hundred cases have shown me that they were acid every time, and what can I say otherwise? Of all the hard things with which the chemist comes in contact, the saliva of the mouth is one of the hardest. It is changed by the diet, the habits, the nervous condition, etc. When you take the saliva and try to analyze it, you cannot, because it is too complex, and in the analysis these complex substances are broken down into simpler ones and we no longer have the properties of the original substance in the saliva. So with the enzymes; you cannot well get hold of them except by the very best methods. Chemistry and the nomenclature have changed a great deal. I have had the privilege of working with some of the best men in the United States, and I am familiar with the works quoted by Dr. Miller; but they do not seem in the best line of thought today.

As regards oxalic acid. In organic chemistry there are likes and dislikes as characteristic as those of the human race. In the organic life, look at tannic acid. It will replace almost any other acid from iron salts, and form the insoluble iron tannate. The calcium oxalate is the most insoluble salt of calcium, showing that calcium will always unite with the oxalic acid radical whenever possible. This will answer Dr. Taylor's question as to why oxalic acid is used in finishing the polishing of marble. Undoubtedly, the oxalic acid acts upon the marble (calcium carbonate) to form calcium oxalate. This acts as a fine powder to rub off the prominent places and fill in the molecular spaces and hence make a smooth surface. This polishing of marble by the use of an acid agent disproves Dr. Miller's position that in erosion an alkaline saliva is necessary for the formation of a smooth surface, and an acid saliva for a chalky surface. In connection with the character of the saliva we must not forget the importance of the channels of flow through which the saliva is forced. We do not realize how powerful this force is which drives the saliva through these lines of flow until we attempt to swallow when having an exposed nerve. The pressure exerted on the nerve during the act of swallowing is so great that the tooth feels as if it would jump out of the head.

Dr. Miller seems to feel that I was a little severe in my discussion of Dr. Kirk's paper, and apparently has considerable faith in the micropolariscope. The reliability of this instrument may be illustrated by the following: We may take twenty men of about the same size and dress them exactly alike. At a distance of one hundred yards all look alike. But if each one is analyzed far more minutely, we see that all are different in composition. So with these crystals of Dr. Kirk's. They look somewhat alike. There are several thousand different compounds which look somewhat alike, but when analyzed are found to be entirely different substances. Dr. Kirk was not definite enough. If he will take these similar crystals and analyze them, he may find them to be entirely different in composition. But he did not do this in his paper.

Dr. Miller also seems to feel that too much importance was placed upon the results shown by Michaels. These results were mentioned to show that in some special cases not even an acid or an alkaline condition is necessary for the decay of cements. Some neutral substances, as potassium sulfocyanid, may be able under special conditions to act as a solvent agent. These results have also been corroborated recently by Young and Hurst, who have shown that calcium phosphate is dissolved to a small extent by potassium nitrate and by sodium chlorid, with the attendant production of acids.

In conclusion, a few words to the beacon lights of our profession. Of these men, most of all, is the highest ethical standard expected. They should be ever willing to lend a helping hand to the young man in his research work, and to recognize, encourage, and refer to the articles which the younger men present to the profession. Unfortunately, in the

past some of our most prominent men in their papers have not given the proper credit to others for the work which they have done. As a result, many young men are discouraged from engaging in research work, feeling that their investigations will not be recognized and given the proper credit and encouragement.

Dr. Hinkins' paper was passed.

The Chairman announced as the next order of business the reading of the paper by Dr. E. Sauvez, Paris, France, on "The Various Means of Inducing Local Anesthesia for Tooth-Extraction."

A *résumé* of the paper, which was in the French language, was then read. The paper is here summarized by presenting simply the author's conclusions, as follows:

THE VARIOUS MEANS OF INDUCING LOCAL ANESTHESIA FOR TOOTH-EXTRACTION.

[CONCLUSIONS.]

(1) General anesthesia, because of the dangers and inconveniences it entails, should be the exception in dental surgery. On this fact is based the importance of local anesthesia.

(2) Of all the methods of local anesthesia known at the present time, cocain seems to give the best practical results.

(3) Cocain hydrochlorid is in our opinion superior to all the other preparations of the local anesthetic group.

(4) Distilled water is the best vehicle for the preparation of cocain solutions.

(5) In general practice, a satisfactory degree of anesthesia is obtained, and all accident is avoided by the use of one cubic centimeter of a fresh solution of cocain hydrochlorid in distilled water 1:100.

(6) When the injection is to exceed one centigram of cocain, a horizontal position becomes imperative.

(7) In the extraction of teeth, it is almost exclusively the tearing of the alveolo-dental ligament that causes the pain.

(8) The degree of anesthesia is entirely dependent upon the manner of making the injection. The after-effects depend on the presence of an aseptic condition.

(9) After the operation, the patient should remain in the reclining position, one-quarter of an hour in the case of injections of one centigram of cocain; from two to three hours for a larger dose.

(10) Well-executed refrigeration constitutes a good local anesthetic, but only for very superficial operations.

(11) The mixed method (cocain injection and refrigeration) constitutes the best local anesthetic.

(12) Stovain, a new local anesthetic, is a vaso-dilator, and is powerful; is less toxic than cocain, and has given the best of results up to date.

Discussion.

Dr. Elgin MaWhinney, Chicago, Ill. You can have no conception of the work that has been done by the essayist until you have read the original paper in full as already published in French in pamphlet form. The short *résumé* read gives you no idea of the subject, but simply a few conclusions thereon. First, he dwells on the point that general anesthesia is very seldom indicated in the practice of dentistry. He points out rightly the dangers, with which you are all familiar, accompanying the use of general anesthetics, due to the fact that the patient cannot be always in the required recumbent position so necessary for general anesthesia.

One or two things I am surprised at: first, the claim that in over 15,000 injections of cocain not a single disagreeable physiological effect was observed. Of course he refers to the injection of but 1 cgm. of cocain, or from 2 to 3 cgm. in rare cases. I have never used 2 cgm. of cocain when I could not get distinct physiological effect upon the heart's action—arterial pressure—even before the syringe is drawn from the site of the injection. Another point which I think is a well-established fact is that one cannot foretell which individual will be the most susceptible. Individuals who are sufferers from anemia or aortic troubles are most

liable to the after-effects of cocainization.

We do not yet know the physiological conditions which contra-indicate the use of cocain. From the amount Dr. Sauvez has suggested using, he is on safe ground. I have never had any dangerous effects from the use of such an amount in the human organism. I have had very marked physiological effects—syncope, loss of consciousness, stertorous breathing, etc.—but nothing alarming. I do not believe the amount he suggests would be fatal to the individual except in the cases he points out as contra-indicating its use. In America we have come to the conclusion that where the agent is to be injected into the tissue the 1 per cent. solution is the most potent. Weaker solutions are not so potent, and stronger solutions are not so potent. The stronger solutions interfere with the local anesthetic effect of the drug. The essayist very beautifully brings out in the French text the physiological relation between the so-called synthetic preparations, and comes to the same conclusions that have been reached by some other experimenters. I published in 1895 that, all things considered, cocain was the safest of these preparations. With the new preparation stovain, of which he speaks, I am not familiar. It is the product of the chemical laboratory only two months previous to the compilation of this text. Judging from what must be the chemistry of it, I have my doubts about its being more efficacious than cocain.

To get the good result of the drug the cocain solution must be injected into the denser tissues, which requires a great amount of force. I use a slightly different syringe from that advocated by the essayist. I have the points made of platino-iridium, and find them sufficiently stiff. They can be submitted to white heat without destroying the temper. I keep my syringe clean in the same manner as the essayist does. I am inclined to question his statement that he injects the cocain into the peridental membrane. He states that there is no effect upon the nerve fibers entering into the tooth. I have stated a great many times and believe that it is possible to inject cocain into the pericementum and extract pulps painlessly.

I want again to compliment the essayist because of the great value of the work presented; the conclusions are identical with those of many investigators who have experimented on the subject, and I trust all will read his contribution.

Dr. J. D. Losada, Madrid, Spain. I have made over 2500 cocain injections. I have tried about ten different kinds of drugs, but have come back to cocain; in my hands there is nothing like it. Cocain is blamed often for what it does not do. I have injected pure distilled water and obtained the same general effect as with cocain, at least twenty times. That shows that auto-suggestion is as responsible as cocain. It is a reliable drug if used with intelligence. I challenge anyone to prove that fatalities have ever occurred with the use of 3 cgm. or less of cocain. Bad effects are experienced equally with the use of pure water; they soon pass away. My average dose is between 1½ and 2 cgm. Some of the liquid is lost in the mouth. I have sometimes observed slight symptoms, but I knew the effect could not be great and that it would soon pass away.

I am interested in that new product stovain, but I am sure Dr. Sauvez never meant to imply that it is as good as cocain. He did not say so to me.

My experience with platino-iridium needles is that they will not bend. I use a new needle for every patient; I think that the safest plan.

Dr. C. R. Taylor, Streator, Ill. I have found that in difficult cases where the gums are very spongy, if adrenalin be applied before the injection a condition of the tissues will be obtained that will be more receptive to the liquid to be injected. By applying pressure upon the gum with the fingers until it is white, practically the same result may be obtained. By pressing the gum with the fingers hard enough to blanch it, the injection will be retained if the needle be not removed for a few moments. I have also found in sensitive individuals that by pressing the gum before the injection

a local-pressure anesthesia is obtained which will allow the needle to penetrate without much pain. I understood from the paper that there was no appreciable effect of cocain on the pulps of teeth when injecting it into the gums. I think there is some mistake in that statement, because if cocain is placed in the nostrils while excavating painful teeth the analgesic effect will extend to the teeth. For the six front teeth, cocain in 5 to 10 per cent. solutions on cotton thread in the nostrils will produce this result.

Dr. L. F. Bouche, Winnipeg, Manitoba. I take exception to the statement put forth about a general anesthetic not being needed in our profession. I find that it is usually very painful to inject cocain into the gums in cases of acute alveolar abscess. The mere fact that a new medium is injected into the gum puts additional pressure on the irritated tissues. In cases like that it is necessary to have recourse to a general anesthetic. I feel sure that Dr. Sauvez must have overlooked that. I have seen cases where hypodermic injection would be almost impossible. I would like to know to what Dr. MaWhinney referred in speaking of the needles. Are they as fine as the steel needles? I have found that the injection of cocain into the peridental membrane does not render the pulp less sensitive.

Dr. MaWhinney. The platino-iridium needles I referred to are not on the market. I have had them drawn to fit the syringe. They are very stiff. My friend misunderstood me; I was not advocating injecting cocain in the gum for the purpose of taking out pulps. That the pulp, however, can be anesthetized in this manner has been proved beyond doubt.

Dr. J. G. Reid, Chicago, Ill. Relative to cocain in the nostrils to relieve pain in the six front upper teeth, I have used it in that way many times with the most wonderful success. One can operate perfectly for a minute or a minute and a half. I use a 10 per cent. solution. This plan was brought to my attention by a rhinologist about a year ago. I have only known one instance where it absolutely failed; but that patient might have been timorous and imagined it hurt when it did not. It varies in its effects from absolute insensitivity to conditions where the sensation does not greatly inconvenience the patient. I presume I have used it fifty times since it came to my attention some four months ago. I do not use it always, but when the patient is in great fear of pain it has been applied with almost absolute success.

Dr. A. H. Peck, Chicago, Ill. I have tried this experiment at least double the number of times Dr. Reid has named, and I must say that in aged persons I have failed very frequently to get satisfactory results. But in patients under twenty years of age it works almost to perfection every time.

Dr. E. E. Haverstick, St. Louis, Mo. I think lysol a better agent than carbolic acid for disinfecting hypodermic needles, because carbolic acid will corrode them and the lysol will not. I think a general anesthetic is very frequently indicated for the extraction of teeth and can be given with much more satisfaction to the patient and the operator than the local anesthetic. In preparing for the injection I dry the gums and use a 25 per cent. solution of cocain over them before attempting to introduce the needle.

Dr. Sauvez—interpreted (closing the discussion). First of all, I desire to thank Dr. MaWhinney for the courtesy of opening the discussion. I did not desire to give American dentists the idea that I am partial to extractions. My report on 20,000 extractions is due to the fact that for about twenty years I have held dental clinics in three hospitals in Paris. Dr. MaWhinney says that he has had some trouble with 2 per cent. cocain solutions, and of course I have had the same difficulty; but now I never use other than the 1 per cent. solution, and never have to record any after-effects. I never employ more than 1 cgm. for each injection. Of course sometimes it becomes necessary to inject more than that quantity. I then place the patient in the reclining position and administer 2 cgm. I do not use the iridio-platinum needles,

because they are too weak, and if pointed enough they are too small and not sufficiently resistant for the injection. In the case of tumefied gums I wipe the gum before the injection with adrenalin. I do not use it with the injection any more, because I have found it unsatisfactory. In regard to the anesthetic for the front teeth spoken of, I have never used it in that way. I have been impressed with the idea that in the extraction of teeth the laceration of the ligament is the most painful phenomenon. If an injection be made through the gum no diminution of the pain in the dentin will occur. Last winter I carried on a series of experiments in Paris, by injecting cocain into the trunk of the nerve in the maxillary bone, but this never resulted in complete anesthesia.

The next paper on the program was one by Dr. L. P. Bethel, Columbus, O., on "Beneficial Results from Oral Hygiene and Prophylaxis," as follows:

Beneficial Results from Oral Hygiene and Prophylaxis.

There seems to be each year an increasing tendency toward prevention rather than cure, in various professions. In law, many prominent lawyers are now using greater efforts to keep cases out of court than to get them into court. In medicine, means and ways of prevention occupy the minds of many. In dentistry, means of prevention have also been studied, and with benefit to the public, for comparatively few teeth have to be sacrificed nowadays, on account of improved methods of treatment and restoration. Not satisfied with this, however, a number of our progressive dentists have sought to decrease, if not to prevent, caries of the teeth—the most persistent and destructive of diseases—through hygienic and prophylactic measures, and the results have shown a great step in advance toward the ultimate.

Dr. D. D. Smith of Philadelphia says that through his monthly prophylactic treatment he has noticed in mouths treated a decrease of from 70 per cent. to 90 per cent. in carious action. If such results can be obtained, is the subject of prophylaxis not worthy of more attention than has been given it in the past?

It is not my intention to enter into a general discussion of the subject. This will probably be done in other papers, but in this paper I hope to show some of the beneficial results from the practice of it, beginning with a class of people with whom oral hygiene and prophylaxis is made compulsory.

As you are all probably aware, the Diamond Match Company have for a number of years employed a dentist to keep vigilant watch over the condition of the mouths and teeth of their employees, especially those engaged in the "dipping room" and other places where phosphorus fumes are generated. While the primary object of this step was to reduce, if possible, the cases of phosphor-necrosis among match-workers, through compulsory care of the mouth and teeth, it has been interesting to watch the general results of the constant application of these hygienic measures as practiced by the employees.

About a year and a half ago, Dr. Knowlton, the examiner, invited me to visit their largest factory, at Barberton, O., and inspect the mouths of the employees. The invitation was gladly accepted and since that time I have made a trip to Oshkosh, Wis., to investigate the mouths of the employees in the factory at that place, for the purpose of verifying what I had seen in Barberton. The four factories in the United States that belong to this company contain more than two thousand employees—men, women, boys, and girls. It is the duty of the dental examiner to make every three months a rigid examination of the condition of the mouth and teeth of every employee. This is done systematically, and tabulated records are kept on file. If any teeth need filling, or if other operations are found necessary, the employee is so notified and is sent to some dentist to have the operations performed. On returning, this employee must bring from that dentist to the examiner a certificate stating that the needed operations have been accomplished and that the

teeth are again in good condition. These measures are exacted of employees under penalty of discharge.

The condition of the soft tissues of the mouth, especially the gums, is also noted and necessary instructions as to their further care are given to the patient. Especial attention is given to keeping the teeth free from calcareous deposits, and to keeping the gums in a normal condition. Every employee is obliged to brush his teeth and gums at least once a day and use such mouth-washes and dentifrices as may be prescribed by the examiner.

At his next visit the examiner compares the work done with the last instructions as entered in his record-book. If any filling or other operation is found faulty the patient is returned to the dentist who performed it, with instructions to have it made satisfactory. By this strict supervision over the oral cavity, phosphor-necrosis, which used to be common among the match-workers, has been almost entirely stamped out. Aside from limiting this dread disease, this compulsory prophylaxis has been of great benefit to every employee and an educator of no small proportions. These match-workers soon see the benefits themselves and take pride in their beautifully clean teeth and healthy gums, and compulsory care of them becomes a pleasure. The employees comprise the poorer class of working people who naturally would take little or no care of their teeth. In inspecting the mouths one is impressed with this fact upon seeing the condition of the teeth and mouths of the new employees, calcareous and soft deposits with resulting gum inflammation being present. If no attempt be made to keep the teeth and gums clean and stimulated, the irritating influence of the phosphor fumes but adds to the inflammatory trouble. Even in the mouths of employees who for a time give daily care to the teeth and then become negligent—brushing the teeth and gums only once or twice a week, instead of every day—the evil effects of the phosphor fumes are seen. The gums soon become inflamed and congested, and a horrible odor is noticed about the mouth and breath. Where the brush is used diligently once or twice each day, however, and the teeth kept free by the examiner from calcareous and other deposits, the gums present a normal pink tint, are firm to the touch, and have every appearance of perfect health and tone despite the irritating tendency of the phosphor fumes that are constantly inhaled.

Now, if we find dental organs scrupulously clean, gums of a normal tint, firm and healthy, and clean mouths, where these prophylactic means have been employed, even in the face of such unfavorable surroundings and among this class of people, what can be accomplished among patients in a general practice if they can be induced to adopt and conscientiously follow out such prophylactic measures?

The examiner, through observation, says that he is confident that the influence of oral hygiene is farther-reaching than ordinarily imagined. Since its enforcement among these employees it has been a noticeable fact that fewer days are lost through sickness. He believes it has an influence on the digestive tract and that better general health is maintained. Also it has been noticed that during epidemics of disease fewer employees are affected by prevailing maladies than before these prophylactic measures were adopted.

After seeing such remarkable results in the mouths of a class of people who naturally give little or no attention to the care of the mouth and teeth, I was curious to see the results of constant care of the teeth of patients in general practice, and through invitation I visited Dr. D. D. Smith of Philadelphia. The results of his work were remarkable, especially those in mouths of patients who had previously been afflicted with severe pyorrheal conditions. Where pyorrheal trouble had been previously treated, excessive absorption of gum tissue in many cases was still noticeable, but the gums were tightly attached about the teeth, were of a pink healthy color, and of firm texture, showing perfect normality with the exception of gum tissue lost through

pyorrheal absorption, and even that had been partially restored. Although a number of these cases had been treated years before, the gums, through this monthly treatment and general care, retained their tone, with no signs of a return of the former disease.

This of itself furnishes a valuable lesson for the general practitioner of dentistry. The results of Dr. Smith's prophylactic treatment are all that could be desired and greater than ordinarily would be expected. All the patients had beautifully clean teeth and gums—wholesome, clean mouths—and there was an entire absence of that disagreeable odor noticeable from unkept mouths. These patients invariably stated that their general health was better since they began this systematic treatment and gave their teeth and mouth daily attention at home.

Dr. William Hunter of England, Dr. Miller of Germany, and others have called attention to septic systemic poisoning from unkept and diseased mouths, and the beneficial systemic results from the adoption of oral hygienic and prophylactic measures; and the cases I have cited, and others where prophylaxis has been employed, that have come under my observation, seem to further demonstrate that an unkept mouth is a detriment to the general health of many individuals.

After a patient has selected a dentist and resigned the care of his teeth to him, he takes it for granted that the dentist will give them every attention possible for their preservation, and the patient has the right to expect the best of care from his dentist. If the daily care of the mouth and teeth by the patient, and a monthly scaling and cleaning of the patient's teeth by the dentist, will retard perceptibly the progress of dental caries, improve the general health of the patient, and keep the teeth and gums in their normal condition and make them most presentable, is it not the duty of every dentist to follow such practice? For this prophylactic treatment the dentist is entitled to a fee commensurate with the time consumed, the same as though performing any other dental operation, and I am sure the majority of patients would willingly pay for such service if its importance could be thoroughly impressed upon them; and I believe every dentist will be agreeably surprised at the readiness with which intelligent patients will take up with the regular treatment idea when they come to understand the benefits they will derive from it. This has been not only my own experience, but the experience of all dentists with whom I have conversed who practice the treatment.

I have observed no detrimental effects from this prophylactic treatment, but universally beneficial results; and to my mind every dentist should, so far as possible, practice periodic prophylactic treatment of the teeth and gums of patients, this plan being not only to the interest and welfare of patients but of the dentist as well; and I believe that the results of such procedure and practice will redound more to the dentist's credit than he may ever have imagined.

Discussion.

Dr. Emma E. Chase, St. Louis, Mo. This subject is of great interest to me. I think it must be so to any woman practitioner, because it is rather the province of women to go after things and clean them up. I think we dentists have always been great theorizers, and when we get such testimony as is given in this paper as to what can be done not only with chosen patients—rich people—but what can be done with poor people, I think it of great value to the profession. Pains should be taken to give as great publicity to these facts as possible, because I think that people like definite facts. If they know this improvement has taken place, if we can show them that they can improve their health and prevent decay by keeping the teeth in good condition, it will encourage others to do likewise. If the teeth of my patients are not clean I make it a practice to have them look at their teeth in the looking-glass; I then inquire how much time they devote to cleaning their shoes, and I find they usually spend more time cleaning their shoes than their teeth.

Dr. J. E. Hinkins, Chicago, Ill. I have long ago given up hope of doing anything with people of mature years, but have had a good deal of satisfaction in results obtained through the public school teachers, for instance. When I have a teacher for a patient I impress the importance of having the school children keep their teeth clean, and get them to ask the children when they come to school if they have cleaned their teeth. If they have not, they are excused until they do so. I have even gone so far as to donate tooth-brushes to a school. I have letters from school teachers saying there has been a wonderful change in the school since the children have kept their teeth clean. They say to them, "You have clean shoes and a clean collar, but look at your teeth!" They say the schoolroom has been almost revolutionized.

Dr. Bethel (closing the discussion). This subject has interested me for a long time. I have presented a number of papers during the past ten or twelve years, and I believe that people are being instructed by dentists at the present time more than ever before. The work is progressing, and I hope it will continue to progress until every dentist can see the benefits that will result from a thorough understanding of its importance. Another thing: When we are at the chair we inhale the patient's breath almost constantly, and I think the dentist should take some precautionary hygienic measures after he has dismissed his patients. For instance, he should not only care for his own mouth and teeth with the use of antiseptic washes and powder and brush, but he should wash out his nostrils as well. We undoubtedly inhale many bacteria from the patient's breath during operations, and such precaution is only a preventive measure that every dentist owes himself.

The following papers, on motion, were presented by title:

Paper by Dr. Richard Grady, Annapolis, Md., "The Benefits of Mastication and Insalivation."

Paper by Dr. J. H. Schlinkman, Baltimore, Md., "Electro-Absorption in Therapy."

Paper by Zahnarzt Dr. Schaeffer-Stuckert, Frankfort-on Main, Germany, "Paranephrin-Bitsert, ein neues Nebennieren-präparat in Verbindung mit Lokal Anästheticis in der Zahnheilkunde."

Dr. C. W. Rodgers, Boston, Mass., moved that the Chairman of Section IV recommend to the congress the appointment of a general committee, to be composed of one chairman for each state, the duties of the general committee to embrace the proper instruction of children of the elementary schools in the care of the mouth and teeth—the work to be carried on with the assistance of the respective boards of education; the several state committees to report each year to the National Dental Association. Also that the congress recommend the same committee for appointment by the National Dental Association, so that the work may be carried on without interruption, the general committee to report at the next—the Fifth International Dental Congress.

Dr. A. H. Peck, chairman, said: Personally I am much gratified with the spirit in which you have gone into the work of this section and the interest that has been manifested, and, as far as I have been able to learn, we have had some of the most interesting papers of any of the sections.

The minutes having been read and approved, the section adjourned *sine die*.

NEW YORK ODONTOLOGICAL SOCIETY.

Monthly Meeting—November 1904.

A REGULAR meeting of the New York Odontological Society was held on Tuesday evening, November 15, 1904, at the Academy of Medicine, No. 17 West Forty-third street, New York city.

The meeting was called to order at eight o'clock by the president, Dr. John I. Hart.

The minutes of the last meeting were read and approved.

The President then called on Dr. Jarvie, as chairman of the committee on the "Dunbar Commission," for his report.

Dr. Jarvie stated that the matter had been referred to Dr. Tracy for attention, and as he was not present, the president deferred the matter until his arrival.

President Hart then introduced Dr. ROLOF B. STANLEY of New York city, who read the following paper:

ORTHODONTIA, FROM THE STANDPOINT OF THE SPECIALIST.

The most vexing problems with which the practitioner of dentistry has to contend are those relating to the malocclusion of the teeth. Whether or not there is greater need today for orthodontic operations than in the days of Fauchard, it is certain that greater attention is now being given to this department of dentistry, and with gratifying results.

It can be truthfully said that orthodontia was born but a few years ago, when the law of occlusion was first recognized and understood, and the almost endless varieties of malocclusion were reduced to a few fundamental types. Previous to that time the term orthodontia implied a bewildering mass of appliances, from which the operator had to select one or a dozen which might accomplish a result. Indeed, it was not always clear in the mind of the operator just what the final result would be. Led on by hope he inflicted upon the patient the discomfort of various ingenious and clumsy appliances, and in the end had accomplished no more than the regular alignment of the upper anterior teeth. Very often it followed that this protracted and trying ordeal had been without avail, for, in a few years or less, the teeth that had been moved returned to their former malpositions. Failure to obtain a permanent result was not uncommon, and therefore the merest suggestion to the patient to undergo such a siege was looked upon with doubt and suspicion. Indeed, this attitude was shared by many practitioners, who had honestly tried to master the voluminous descriptions of sundry appliances, and had failed, and therefore could not hold out to the patient any hope of success in the undertaking. The term "regulating teeth" was applied to such operations, and expressed the unscientific procedures of the times. It is little wonder that the progress of orthodontia was so slow. Dental literature contained nothing calculated to invite a further study of the subject. In fact, those who were patient enough to wade through the mere description of mechanical devices could only come to the conclusion that each case was a law unto itself.

With this conviction uppermost, the one thought was to construct an appliance which would be an improvement over all others, to pull or push the teeth into regular alignment. That the positions of the teeth in the lower arch influenced the positions of those in the upper was never considered, as is shown by the fact that the appliances constructed were all for the upper teeth. In spite of this

chaotic mass, and of the many questionable results and failures there were a few men who were not discouraged by the unrewarded efforts of others, but labored onward toward the solution of the problems of malocclusion. Today we are enjoying the fruits of their labors and are gradually adding to the store of knowledge they have imparted to us.

Orthodontia has little in common with dentistry. As a rule the dentist looks upon the treatment of malocclusion as distinct from the other services he is called upon to render to his patients. If he persuades himself to undertake such an operation he does so with some misgivings as to the outcome, not because there is any doubt of his ability to obtain the desired result, but because experience has taught him that the other departments of his practice absorb his time and thought to such an extent as to almost exclude the prompt attention to the details of the case. The laudable desire to learn and to apply his knowledge for the benefit of his patient is uppermost in his thoughts, but he finds the subject so great that he is called upon to choose between making it a more comprehensive study, or practically eliminating it from his practice. Specialization is but the natural outcome of the growth of the many departments of dentistry, and tends to direct the study into a more scientific channel. The oral surgeon is equipped with knowledge and ability which enables him to perform operations to better advantage than the general practitioner. Doubtless also, that troublesome affliction "pyorrhea alveolaris" is best cared for by those who have given their time to a scientific study of its many phases. That orthodontia should command a place of itself is evident when the many questions to which it is allied are considered. The scientific treatment of malocclusion involves far more than the selection and application of mechanical devices to effect the movement of the teeth. Indeed, appliances are but a *secondary* consideration—a means to an end—to be decided upon after the more important requirements and possibilities are carefully considered. To allow them to take first place, as is so often done, is to commit an error at the start.

The modern school of orthodontia has opened new and interesting lines of study. Founded as it is upon principles which are in accordance with the laws of nature, it is destined to achieve the highest pinnacle of success. The etiology of malocclusion, now but imperfectly understood, invites the closest study and observation. It is not too much to predict that the time is not far distant, measured by the progress of the age, when both inherited and acquired causes of malocclusion will be so thoroughly understood that treatment in anticipation will command the attention of both dental and medical professions to as great an extent as fully developed malocclusion does today.

In order to recognize abnormal conditions it is first necessary to thoroughly understand what constitutes the normal. In the evolution of mankind the modifications of the anatomy are in accordance with its environment. A gradual change has taken place in the size and shape of the jaws, accompanied by a harmonious transition in number, size, and form of the teeth. The theory that a child may inherit the small jaw of one parent and the large teeth of the other, or *vice versa,* is not in accordance with the work of nature. Consider for one moment the manner in which the teeth are erupted, and their relation to the development of the jaws. The process of eruption is by gradual stages, and extends over a period of about twelve to fifteen years during the growth of the child. From this it is evident that in size and number the teeth were designed to harmonize with the size of the jaws in adult life. The teeth, in erupting, aid in the development of the mandible by a wedging process, and in the upper, aid in carrying the alveolus forward and outward. It is evident from these two facts—the gradual development of the teeth and their function in assisting in the development of the jaws —that the paramount design of nature is to fashion the teeth in harmony with the size of the jaws and the physiognomy. The study of comparative dental anatomy

offers sufficient proof that this is so, and it is only through a comparative method of study that scientific knowledge can be obtained. To accept the theory alluded to, that a child may inherit the jaws of one parent and the teeth of the other, is to accept a theory based upon false assumption. That inharmony exists between the size of the jaws and the size of the teeth, where malocclusion is present, is due to retarded development of the jaws or a premature development of the teeth, causing them to erupt into malpositions, thereby shortening the line of occlusion, and in turn lessening the need for development of the jaws. Where the teeth are too small for the size of the jaws, the discrepancy is usually in the region of the upper incisors or the lower first premolars. These cases are so rare that they must be considered separately from the crowded condition which is the rule. Arrested development of the jaws may be the result of lack of use, for in the less civilized races malocclusion of the teeth is rare. The premature loss of the deciduous teeth, or the loss of permanent teeth during the stage of the development of the jaws, is certainly a cause for inharmony.

With these facts before us—the relation of the teeth to the development of the jaws, and the loss of teeth as a factor in retarding development—it is amazing that teeth are sacrificed in the treatment of malocclusion to the extent that they are. The new school of orthodontia does not take the position that extraction is *never* justifiable, but it does teach, and most emphatically, that when normal occlusion can be obtained, with subsequent development of the mandible, and a carrying forward and outward of the alveolus, it is unscientific and disastrous to sacrifice a tooth or teeth to overcome a crowded condition of the arches. Those who advocate extraction fail to comprehend the close relationship which exists between the development of the teeth and the development of the jaws, nor do they understand the law of occlusion. The typical number and forms of the teeth mean nothing to them. The single thought is to place the teeth in regular alignment. On the other hand, the exponents of the new school of orthodontia believe that nature works upon definite lines, at all times trying to harmonize variant conditions, or the proportions of the anatomy. That she is not entirely successful in every instance is due to obstacles put in her way by modern methods of living. It is the province of the orthodontist to assist in harmonizing conditions—*not* by a process of reconciliation to the obstacles imposed upon her by modern civilization, but by assisting in the natural and orderly fulfilment of the laws of development, thus enhancing the usefulness and beauty of the organs of mastication, and in harmonizing the facial lines.

Scientific methods in the treatment of malocclusion are the result of a broad and comprehensive study of the many phases of the subject. A most important lesson in the study of orthodontia is the typical or normal occlusion of the teeth. In man there are twenty teeth in the deciduous set, which are replaced, as the jaws increase in size, by twenty of the permanent set, termed succedaneous teeth, besides twelve permanent molars. They are designed, in point of number, size and shape, and in arrangement, to give the greatest possible support to one another in the same arch, and to those of the opposite arch. They are maintained in their positions by the occlusal inclined planes of the cusps; by the support, due to harmony in size, given one arch to the other; and by the muscles of the cheeks, lips, and tongue. When these factors exert their normal influence, the balance of equilibrium is maintained; but when perverted, there is not only a disarrangement of the teeth of both arches, which affects their normal functions, but a more or less arrest in the development of the jaws, with consequent marring of the facial lines.

The relation between the development of the teeth and the osseous structures in which they are placed is of especial interest. The mandible is developed slightly in advance of the maxilla, and to an extent acts as a mold over which the inferior border of the upper jaw is

formed. In the same way the lower arch of teeth acts as a mold for the upper. Growth of the mandible occurs between three fixed points—the ramus, the mental foramen, and the symphysis menti, according to the development and eruption of the teeth. The increase between the symphysis menti and the mental foramen occurs during the development of the incisors, canines, and premolars, with little increase after these teeth are erupted. The greatest growth between the mental foramen and the ramus occurs during the development of the second and third molars. There is little increase after the third molars are erupted. Without entering further into the development of the anatomy in this region, these facts offer evidence that the great plan of nature is to harmonize the proportions of the anatomy. Therefore, if malocclusion of the teeth exists, it can be more often attributed to causes operating after birth, rather than to a disproportionate inheritance from parents of unequal physical attributes. Anomalies exist, it is true, but they are the exceptions to the rule, and should be recognized and treated as such.

A record dating back several thousand years reveals that in that time the occlusion of the teeth, their number, and their general form and structure, have not changed materially, if at all. We find a variation in the shape and character of the face and head, due to racial characteristics, or to environment, or sex, or age, but the general course of anatomical development is the same in every instance. These facts enable us to establish an ideal, which has for a determining factor the typical number of teeth. By this it is not meant that the same standard of facial harmony can be applied to all cases, but that there is no case which has not its own ideal, which is an harmonious accompaniment of the characteristics enumerated—namely, race, type, age, sex, etc.

To make a correct diagnosis of the deviation from the normal when considering the occlusion of the teeth, it is necessary to possess a knowledge of the fundamental types of malocclusion. The first permanent molar is the most reliable point from which to judge the mesio-distal relation of the two arches, though it is necessary to consider all the other teeth in the same manner. The *individual* positions of the teeth must also be noted with regard to their deviation in one or more of seven malpositions. Classification of the type of malocclusion can then be made, which determines the general movement of the teeth into the normal line of occlusion indicated by the type, etc., of the individual.

Appliances to accomplish the movement of the teeth can then receive attention, and the pattern decided upon which, in the judgment of the operator, will effect the desired change in the surest and simplest manner. The requisite qualifications are efficiency, simplicity, delicacy, and inconspicuousness. *Efficiency* should receive first consideration, for the primary object of the appliance is to move the teeth in the shortest time consistent with the welfare of the patient. *Simplicity* is next in importance. The appliance possessing this attribute is easy of manipulation, free from bulk, and direct in the application of its power. *Delicacy* applies to the proportions. The freer the appliance is from bulk, the less it will interfere with the functions of the mouth, the danger of caries will be diminished, and the less will be the annoyance to the patient. *Inconspicuousness* is a consideration, but should not be made paramount to the other qualifications.

An analysis of the mechanical principles of the old-school appliances reveals that expansion of the arch was the object of the designer, but in a very limited sense. The application of the force was so restricted that it was practically impossible to expand the arch in every direction at the same time, or change the mesio-distal relation of the arches. Even the use of a combination of the various designs would not yield the results obtained today by the use of the expansion arch. Therefore the question of extracting one or more teeth very naturally suggested itself, not because the harmony of the facial lines would be marred by

allowing all the teeth to remain in the arches—for inharmony was more often brought about through the loss of teeth—but because of the limitations of the appliances in *providing room* for the teeth. Today we are provided with efficient, simple devices which will accomplish the movement of the teeth in every direction, simultaneously. Thus, with the intelligent application of the modern inventions the necessity of sacrificing teeth to provide room is eliminated. The cases where extraction is justifiable are so rare that such a course should only be decided upon after the most careful deliberation, weighing with precision every phase of the case, balancing its requirements with the possibilities of tooth-movement, and foretelling the final result upon the facial lines.

To recapitulate briefly: The practice of orthodontia embraces a knowledge of the normal development and structure of the dental anatomy, its functions, and relation to the line of facial harmony; the deviations from the normal and their causes, and the effect of such deviations upon the functions of the organs of mastication; the relation between the dental and facial inharmony; the means of averting the tendencies toward, or of correcting the abnormal; the possibilities in treatment prescribed by natural laws; and finally, the digested knowledge must be accompanied by patient and skilful application on the part of the operator.

The foundation stones of the science of orthodontia have been well laid for us. Its future progress will depend upon the fidelity with which we OBSERVE, COMPARE, REFLECT, and RECORD.

Discussion.

Dr. N. W. KINGSLEY. It struck me that the writer had gone over pretty nearly the whole ground, giving us in general terms the foundation of the practice without being particularly specific. The practitioner needs something more. He desires to know how this doctrine is applied.

When he spoke about malocclusion, I thought to myself, "I do not know that I ever had any other idea." I believe for forty or more years I was treating cases upon that basis. About the first thing I ever observed was the occlusion. Those who have been associated with me will bear me out in this. The whole thing seems to hinge upon that point.

As to what the gentleman says about inheritance of a small jaw and large teeth, or a large jaw and small teeth, I am still in doubt; I have never been able to exactly make up my mind. It is possible that a child may inherit one peculiarity from one parent different from another in the other parent—that he may inherit from one parent a large jaw and from the other small teeth. I have seen a large jaw which would seem to have come from the father and teeth which were certainly remarkably like the teeth of the mother.

There are a great many things that we do not know. We can form an opinion, but it is not more than a guess, so that while on the whole I indorse the paper, I would rather wait and see what some other gentlemen have to say in regard to the application of its teachings. I doubt very much whether anyone here will be able to find any particular fault with it, and that generally seems to be the object of a discussion. We do not want everyone to be on one side; what we want is a difference of opinion with resulting discussion.

Dr. R. OTTOLENGUI. Mr. President, I quite agree with Dr. Kingsley that there seems to be very little in this paper that one can dispute, and as Dr. Kingsley made allusion to those who had had the honor of being associated with him, I wish to bear him out in the statement that occlusion was always taught by him to be the first thing to be studied in order to make a correct diagnosis. I will go farther than that, and say that personally I was taught to consider the positions and occlusion of these very teeth that have now become the foundation of the Angle system of diagnosis.

I think Dr. Kingsley taught the idea of jumping the bite, and the necessity for that operation was largely determined by the fact that the mandible as seen in the study of the relations of the two first

molars above and below showed that the mandible was biting in a distal position. On the other hand, I have been quite closely following the tenets of the so-called Angle school, or new school, and if there is a difference between the two schools I think it might be brought out a little clearer if I make this statement. I am not speaking now of individuals, but of many so-called general practitioners, who have essayed the regulation of teeth, using the old term. The old idea seems to have been simply to fulfill the desire of the patient to have the visible teeth straightened; consequently if it seemed simpler to extract, occlusion was not considered, but attention was given to simply straightening the anterior teeth; and I might almost say simply the anterior teeth in the maxilla.

The cases where that is done by the Angle disciples, if I may use such an expression, are exceedingly rare, and they would probably be in the mouths of very young children, where two or four teeth have come in and it seems advisable to interfere immediately, the regulation of the occlusion being left for a later date; but the so-called new school begins at once upon every tooth in the mandible. Those that are in proper position are left as they are. Those that are in malposition are moved into that position which will make a perfect occlusion.

Moreover, the study of the physiognomy very often in older practice was restricted simply to the study of the profile. Nowadays the whole face is considered, and very often what appears to be a perfect profile will be found to be an imperfect face viewed from the front. I have in mind such a case, where the profile was not particularly bad, but where the teeth were so crowded that even by looking at the molars one would suspect that there was a lack of development in the inter-maxillary region. That patient absolutely required the movement of teeth and the development of that portion of the face—the immediate center of the face around the mouth both above and below—which never could have been enlarged if any teeth had been extracted. It is only a type of a class where it would have been a very simple matter to extract a bicuspid on each side of the mouth. As a matter of fact the canines in these cases are often the only teeth that are right. All the other teeth should be moved out into a circle which will include the canines.

Dr. C. S. Stockton. It was the practice, and perhaps is now, of some of the older practitioners to extract a tooth now and then. Leave it for a year and see what becomes of it, and how often have you found that nature is one of the very best aids and helps that you could possibly call to your assistance? She has done wonders for you, and she will continue to do wonders for you; but if treatment be undertaken at once with the determination to leave all the teeth in, and reduce the abnormal to normal position, what a long time of suffering is before that child!

On someone asking, "What is the best thing to fill teeth with?" the answer was, "Common sense," and it is doubtless true in regard to the regulating of teeth. You can take up these theories and carry them out, but they do not always result as you expect they will.

The appliance should be a rigid one. It should be fixed, and your force should be brought to bear upon the one point where you desire it to come.

Dr. F. C. Brush. There was one thing in Dr. Stanley's paper that I was listening intently for; I want to compliment him because nowhere in his paper did he use the term "irregular," or "a correction of irregularity." I wish to protest against the use of these terms by professional men. I think they convey an entirely wrong impression.

I have brought with me tonight some casts which represent very well the methods of the old school. It is called a case of "capital regularity," but, as I expressed it to Dr. Stanley early in the evening, I think it is one of "damnable deficiency." The occlusion evidently has not been considered, although I did not secure a good history of the case; I think this is an interesting cast, and with your permission I will pass it around for the inspection of the gentlemen.

Dr. W. D. Tracy. I have no doubt that every successful practitioner arrives at a certain point in his practice where his success will enable him to say what kind of work he will or will not do, but not having reached that point as yet, I am still taking cases of orthodontia for treatment, though I must confess that I long to reach the point where I can in justice to myself turn all my orthodontia cases over to a specialist, for there is no doubt in my mind that the specialist is the man to handle such cases.

Dr. Wm. Jarvie. Dr. Kingsley in his remarks so perfectly expressed my own views of the paper that I will not repeat them. I viewed it largely as an expression of the principles of orthodontia rather than dealing in special modes of treatment.

There is one term that has been used tonight that I do not like, and that is the term "new school." Our present standard of knowledge and perfection in treating cases of orthodontia has not been attained by any sudden leap; it has been by a process of slow evolution, and the gentlemen who started "regulating teeth" —you will excuse me if I use the phrase, because I think there *is* propriety in it, for I have seen cases of very good occlusion back of the canines where the anterior teeth have been very irregularly placed—those gentlemen, I repeat, who treated these cases of orthodontia many years ago did not have the knowledge or the appliances that we have today. Those who are practicing the treatment of such cases today have had the benefit of the years of work that have preceded them, and they should not claim all the credit, as though they were a new school, having attained all the knowledge they have today by their own efforts. They have acquired it to a great extent from those who have gone before. There is no new school; it is simply the present standard of excellence that exists in the dental profession.

I notice that in the paper there was a very strong feeling in opposition to the extraction of teeth in almost all cases. There are many cases of irregularly-placed teeth among people who are poor, among boys and girls who are delicate, nervous and sensitive in disposition, and who could not submit to the tedious and severe operations necessary to place all their teeth in perfect occlusion. Many times, if such were done, instead of having harmony of teeth and feature, there would be gross inharmony. There are many cases where it is desirable from one cause or another not to get a perfect condition on account of the environment, and we must take that into consideration in the treatment of our patients, particularly in this line of work.

Sometimes the purse of the patient may have a great deal to do with the manner in which we would treat a given case. Sometimes by the extraction of a tooth we should not obtain that perfect result which could be accomplished by one or two years of constant attention, but the patient might be so situated that he could not give that attention, or pay the cost of the operation; but by a simple operation a very great improvement might be made. There are always exceptions to general principles and the paper read tonight dealt with general principles.

I recollect two cases that came into my office, of twin boys thirteen years of age. The bicuspid and molar teeth occluded perfectly. The canine on the right side of one was forced entirely out of the arch, and the lateral and bicuspid were almost touching. The canine on the other side of the mouth was in the same condition in the other twin. It was perhaps poor judgment on my part, but I endeavored to bring those canines into line, and after two years' work succeeded partially; but I think in that case it would have been the part of wisdom to have extracted that protruding canine. It is an exceptional case and one of those cases that must be treated exceptionally and not on the general principles laid down in the introduction to the general subject of orthodontia.

I think the general practitioner should not only understand the principles of treating cases of orthodontia, but be able to treat them. The dentists, too, of the United States do not all live in cities

such as New York, Boston, Philadelphia or Chicago. They are scattered throughout the country in smaller towns and in villages, and in these small towns and villages cases of this class are just as likely to occur, and the dentists there should be competent to treat them. Occasionally an extremely difficult case will present itself; then by all means, in the country or in the city, send it to some one who makes the treatment of such cases a specialty.

Dr. Ottolengui. I came here tonight because Dr. Stanley particularly asked me to come, and I think that Dr. Stanley did so because he knew that I know certain things which if occasion arose he would like to have said by some one other than himself. Dr. Jarvie has made that occasion.

I want to say first that there is no one for whom I have a higher regard than Dr. Jarvie, nor whose opinions I respect more. Dr. Jarvie says that there is not a new school of orthodontia. When I first heard the term "new school" I looked upon it much as Dr. Jarvie does, as a piece of conceit on the part of the men who are in the new school, but I have modified my views compulsorily. I have the honor now to be personally acquainted with practically every man who is in that so-called "new school," and it *is* a new school; but it is misunderstood, if it is understood as Dr. Jarvie understands it.

The new school is composed of men of this complex character; they make the proudest and most dogmatic claims as to what they can do, and yet they are the most modest sort of men I have ever come in contact with. They do *not* discredit the work of those who have gone before.

The new school means not a set of appliances totally different from any other set of appliances, not particularly a mode of work that is absolutely new, but it means an entirely new *motif* in the work, if I may so express it. It means a consideration of the position of every tooth and the simultaneous rearrangement of all the teeth; they say—because they *know* they can do it—that they can rearrange a complete set of teeth almost as quickly as the old school would undertake to rearrange or regulate three or four upper incisors.

Now, the question of fee has been brought up. Certain patients are too poor to have a certain amount of work done. The *motif* of the new school is to do the work right and get the money afterward, if possible; if they cannot get it, do it anyway. They are men who have an absolute love of the work they are doing, and they get their money out of those who can pay perhaps more than the ordinary practitioner would get; but they will undertake cases for poor people for the same fee that the general practitioner charges for extracting teeth. I say this knowing it to be true.

I have in mind a young man, a recent graduate of the new school, to whom I listened this summer. He put on the screen the result of a year's work in a small town in the northern portion of Wisconsin, a town of less than four thousand inhabitants. He went up there as a specialist. He went into a community where no one knew or cared that their teeth were crooked; he put upon the screen the reports of some twenty cases, and he told me that he had received less than five hundred dollars for his year's work.

The new school of orthodontia recognizes the principles of occlusion, of malocclusion and the restoration of every tooth as nearly as possible to the position of occlusion, and of getting as much money as you can for it afterward.

Dr. Jarvie. I was misunderstood perhaps in what I said in regard to the new school. I said I objected to *the term* "new school"—not to any such principles as would actuate any of the gentlemen Dr. Ottolengui has mentioned.

He spoke in his later remarks of the fact that the new school sought for the proper position for individual teeth in the hope of proper occlusion; that they try to overcome malocclusion. I do not see that that is any different at all from the school that has been practicing. I do not like the term "school" at all, and I do not see that the principles actuating

the class that Dr. Ottolengui mentions are different whatever from the motives that have actuated the dentists in this community in time past. As I understand it, the motive that has actuated the dentists in this community is *to do the very best possible for their patients,* and that is just what he claims these gentlemen are doing. We are all practicing that same thing. If there is anything in what they are doing that the dental profession in general does not know, or is not practicing, that is a different thing. It might call itself a "school," but I do not think it is a good expression.

Dr. Ottolengui. I think that Dr. Jarvie has misunderstood me. I did not mean a mercenary motive at all. I know very well many practitioners in dentistry are doing a great deal more work than they are being paid for. I mean that the new school man in orthodontia has a certain ideal, and if he takes a case at all he takes it to reach out for that ideal. There are one or two important things in this new school that makes this more feasible than it was in the old days.

In the first place, it has been discovered in modern times that room can be made in the arch by moving the arch back. Heretofore, enlargement of the arch meant moving the anterior teeth forward, or moving the bicuspids laterally. The distal movement of the bicuspid is due to the new school. That is one very important thing that discriminates between the new and the old schools.

The teeth can only be too large for a jaw providing the ends of the arch are left stationary; that is to say, if you start out with the idea that the arch cannot be enlarged. If you can move those second molars back and the first molars back also, there is no such thing as teeth being too large for the jaw.

Retention of what you get is another principle, of course. That is very important, and whether or not that has been entirely worked out by either the new or the old school is, as Kipling says, "another story."

It has been discovered that a complete set of teeth, fourteen teeth, can be moved distally, and those things can be done coincidently with the so-called "crookedness" of the other teeth. I believe that is practically a revolution in orthodontia.

Dr. Kingsley. The case of the so-called "new school" as presented by Dr. Ottolengui is an ideal condition. I do not know that we shall ever reach it, although I hope we will. I would only say this, that if all the cases are going to be referred to a specialist, God forbid my being a specialist. I have had experience, and I know the difficulties to be overcome. I think that man who got $500 and took care of twenty cases certainly earned his money. He was doing it for some other object than getting the money.

Dr. Jarvie asked a question which permits me to say a word about the extraction of teeth. I have seen horrible things result from the extraction of teeth with a view of correcting irregularity. I have seen one tooth after another extracted, and still another irregularity resulting, and so on until the whole jaw, we might say, was wrong. To such a wholesale extraction of teeth as that I am opposed. But there are circumstances in which the very best thing that could be done would be to extract the teeth. I have a case in mind which has been illustrated in my book.

I have seen many cases where the upper and lower teeth came well together in the bicuspid and molar region, but the lower incisors were crowded together, making an irregularity there which was disfiguring. I would not approve of this new school taking hold of that case and moving all the teeth in the mouth, breaking up an occlusion which is good—good for every purpose for which regularity is called for.

I have over and over again extracted one of those incisors, and brought the other three incisors together into a perfectly regular arch, so that an ordinary observer would never miss the tooth.

Dr. Stanley. Referring to the old-school men, we have counted upon Dr. Kingsley as one of the few who labored hard to bring us to our present state. In the fixed rules, as they have been termed,

we of course allow much liberty to deviate from the regular methods. These cases are the exceptional cases, and as has been said a little earlier in the evening, we must use common sense in dealing with them. Extraction is so often practiced without any thought of what the final result will be. It is for that reason that the so-called new-school men are so heartily opposed to it. They do not take the position that it is never justifiable. They take the stand that extractions are very rarely indicated, and should be the last consideration—not the first.

I do not know that there is any warrant for speaking of the inharmony resulting from inheritance of the large jaw and small teeth, or small jaw and large teeth, as a cause of malocclusion. That has been given as a general cause for malocclusion. Now, if I may call it selected inheritance, why is it that it is always the small jaw with the large teeth? There might be some cases where there is a large jaw and small teeth, but it cannot be applied as the rule generally, or as a usual cause for the crowded condition of the arches.

I have enjoyed the discussion very much indeed, and think I have gained some points. I thank you all for your attention.

President Hart then thanked Dr. Stanley in the name of the society for his interesting paper.

Report of the Committee on the Dunbar Commission.

Dr. Tracy. The matter that was referred to me at the last meeting, was in regard to the resolutions that were sent to us for our indorsement relating to dentists in the army. Inasmuch as the resolutions have been read, it will not be necessary for me to re-read them.

At the time they were read and submitted for indorsement Dr. W. W. Walker requested that they might be amended in one of their clauses. I communicated with him and here is the letter he wrote me: "The amendment I spoke of was simply this: First, that the army should require the services of a dentist. Secondly, that the army dental surgeon should receive the same pay as the army medical surgeon does; that is all."

I have added this: "Therefore, be it resolved that this Association most respectfully request the Honorable Secretary of War to recommend to Congress, etc." (as contained in the MS. to be forwarded to Washington).

It is our opinion that the professional standing and services of the army dental surgeon should entitle him to recognition as a commissioned officer, and that his salary should be sufficiently large so that he may be able to devote his entire time to the army, doing no dental work outside of these limits.

I move that we indorse these resolutions as amended.

Dr. Nash. What would become of these resolutions after their adoption in this form? Would they be sent to a congressman or would they be returned to Dr. Dunbar with a statement of the reasons for the change?

Dr. B. C. Tracy. I cannot see any reason why we should confer further with Dr. Dunbar. We make our indorsement as requested, and with that I think it should be forwarded to the Secretary of War.

Dr. George Evans. I would like to ask what position a dental surgeon has in the army.

Dr. Tracy. Contract surgeon.

Dr. Evans. Is he a commissioned officer, or non-commissioned officer? I think it is derogatory to the dental profession for any graduate to take such a position in the army. You never will gain standing for the profession where men in it will accept positions under such conditions. I am talking common sense. No man around here would take such a position as that.

Dr. Tracy. Nothing derogatory is intended. I wonder who is going to fill the teeth of the men in the army? Someone has got to do it.

Dr. Evans. If men cannot appreciate the dental profession, they ought to suffer for it. I believe that men of ability ought not to go there. Think of where

they are likely to be sent, South America for instance, and other places.

Dr. Ellison Hillyer. This is a matter of evolution. It is only by means of this sort of thing that proper recognition will be given to the dental surgeon in the army.

There are men who are perfectly willing to go anywhere, and do not feel themselves lowered by it. Somebody has to do it, and there are men coming out of college who are perfectly willing to do it, and who bring no discredit to the profession or themselves in doing so. I know of many such in the navy.

Dr. Ottolengui. I would not oppose the resolution, but as long as the question has taken this turn, and I happen to know something about it, I will express myself.

In the first place, the army contract surgeon as he is paid is not in the position of a menial, but is in the position of fulfilling an honorable mission. He has no military honors. Just exactly what are military honors? The military men in the army see a great many reasons why he should not have them, and one of them is the difficulty of having him placed in command. The very word "officer" means a man who has the right to command. When you speak of a man being surgeon-general in the army he is the medical general of the army. If the surgeon-general is in the field, and the general in command orders his army forward, the men have to obey.

The surgeons in the army have power. They have the same power we see in our civic government. Our Board of Health has power, and you know very often if you want something done, if you can possibly prove it is detrimental to health, you can have it done by the Board of Health. It is just the same thing in military tactics. The medical men have medical power over the men, and the general in the army has military power. Where are you going to find any military power or medical power for the dentist? These gentlemen are not menials. They are not kept away from social functions, balls, and all that sort of thing. There is absolutely nothing derogatory to their position, and I tell you, gentlemen, you may make a million of these resolutions, and they will do no good.

A motion to adjourn was carried.
Meeting adjourned.

W. B. Dunning, D.D.S.,
Editor N. Y. Odont. Soc.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

Special Meeting, November 7, 1904.

A special meeting of the First District Dental Society of the State of New York was held on Monday evening, November 7, 1904 (the regular meeting night being election night), at the Academy of Medicine, No. 17 West Forty-third street, New York city; the president, Dr. Henry D. Hatch, in the chair.

Dr. R. Ottolengui of New York read the following paper:

A Contribution to the Study of Sterilization, with Especial Reference to the Work of the Dentist.

Why do we sterilize instruments? Common cleanliness, a practice which has come down to us from the most ancient times, dictates the need of washing instruments, but sterilization means much more than that. Why then do we practice this precaution?

I pause here for a moment, that you may consider this question, because it is not idly asked. It seems, I know, a self-evident proposition that instruments should be sterilized, and yet I doubt if many dentists have seriously estimated the object in view. I am moderately certain that only a very limited number, even of those who have sterilizers, operate with instruments which are surgically aseptic.

Why, then, should instruments be sterilized? Bacteriologists inform us that there are certain micro-organisms which are inimical to man. These may be broadly divided into two groups: Those found associated only with special diseases, which for this reason they are said to cause—for example, the germ of cholera; and again, those found indiscriminately in connection with many diseases, as for example pus-producing germs. Laboratory experiments show that a medium known to be aseptic may be contaminated by the introduction of the most microscopic quantity of these germs, and that in a favoring environment propagation occurs, the germ mass rapidly increases, toxic poisons are generated, and the train of pathological phenomena common to the presence of the particular germ invariably follows. As an example, which will become pertinent to later considerations in this paper, I may mention that a pus germ introduced into dead or dying blood kept at the normal temperature of the body will result in the formation of pus, which, increasing in quantity, brings us into the presence of an abscess.

In studying the quantity of bacteria needed for inoculation, it is known that a bright needle may be dipped into a pus cavity, then wiped with a piece of chamois, until so far as the human eye can see the needle point appears to be clean, and yet if this be dipped into a favoring medium and the proper temperature be maintained, propagation occurs. This emphasizes the fact that cleanliness is not necessarily an aseptic condition. Hence the term "surgical cleanliness."

Before we can determine whether or not dentists insist upon surgical cleanliness in their work, it becomes needful to learn just what surgical cleanliness is. Let us, then, in imagination visit the surgical amphitheatre and study the precautions which the surgeon takes. These are twofold, having relation first to his instruments and second to his person. Additional care has relation to bandages, gauzes, sutures, and all classes of dressings.

Instruments are boiled, but it must be

particularly noted that they are not only boiled after each operation, but despite this they are again boiled just prior to the beginning of the next surgical adventure. This is an exceedingly important point, and it is because so few dentists seem to have given this due appreciation, unless I am mistaken, that I have ventured the assertion that few dentists operate with aseptic instruments. The surgeon recognizes other sources of contamination besides the wound into which he dips his knife. If operating upon a diphtheritic throat, he wishes not only to free his bistoury of the germs of that disease—which is assured by boiling after the operation—but he must also be certain that no other organism has reached the surface of the steel after it has once been boiled, and for that reason he insists that the bistoury shall be boiled again just before he uses it. And not only that; he further requires that it be handed to him on an aseptic tray, or by the hands of an assistant who has sterilized his fingers, and he takes and uses it with a hand that he has made sterile just prior to entering upon his work.

This is sterilization. This is surgical cleanliness. This is the mode of performing an aseptic operation. Are these precautions taken by the dentist? Is it requisite that they should be strictly observed? To the first question we are forced to reply in the negative. The second calls for an analysis of the demands of the situation to be met by the dentist.

First, then, there is a wide difference in the general aspect of the work of the surgeon and of the dental surgeon. There is no conceivable operation performed by the general surgeon which does not involve soft tissues, and however diseased the immediate field of this operation may be, more or less normal tissue is always close by, and it becomes his duty neither to spread the disease which he essays to exterminate, nor to newly infect the tissues by the introduction of a germ not already present. Even when the true disease is seated in the bony parts, as in bone necrosis, he must reach these parts by obtaining access through soft tissue. It is this one fact, that the surgeon always deals with soft tissue, that compels sterilization of the instruments, which always touch the soft tissues; of his hands, which may touch these tissues; and of his sutures or dressings, which must touch these tissues. It is this contact with soft tissues which renders aseptic precautions so absolutely necessary in all departments of general surgery.

How is it with the dentist? Primarily he deals with the teeth, the only bony part of the body not entirely covered by soft tissues. True, it is generally conceded that caries is of germ origin, but I think no one will claim that caries of a tooth was ever produced by inoculation from a dental instrument which carried the disease from another mouth. It follows, then, that when dealing simply with a tooth surgical cleanliness is not a prerequisite. That I may not be misunderstood I must become more specific. In the ordinary filling operation the dam is placed over the tooth affected and two or more others. This isolates that part of the tooth which is not covered by soft tissues; but what is far more important, it covers and protects the soft tissues which do surround the rest of the tooth. Having seen that the main reason for surgical asepsis is the danger of inoculation through contact with soft tissues, we more than ever see the tremendous advantage that the dentist has enjoyed by the use of the rubber dam, which isolates his field and quite extensively protects adjacent parts. This view also indicates the need of accurate adjustment of the dam, and the avoidance as far as possible of leakage about the necks of the teeth.

Returning now to the tooth operation, we find that we are to deal with a part of the body suffering, let us admit, from a disease of bacterial origin. Aside from the fact that this disease is of slow growth, and that the environment of the tooth constantly offers more of the needed germs than could possibly be introduced on a bur or other instrument, we must remember that even though we touch the adjacent unaffected tooth with a bur laden with the carious matter from

a previous case, it is highly improbable—nay, I do not hesitate to say that it is impossible—to thus inoculate that tooth with caries, in the sense that a surgeon might inoculate his surrounding tissues were his instruments contaminated with infectious material. In all ordinary operations upon the teeth themselves exclusively, it is therefore quite sufficient that the dental instruments should be clean, in the general acceptance of that term, and this may be satisfactorily achieved by boiling after use, without recourse to a second sterilization just prior to their next employment.

In proportion, however, as the dentist approaches true surgery, so grows the necessity for surgical cleanliness. To pass at once to the opposite extreme, it is manifest that in antral operations, implantations of teeth, treatment of necrotic conditions, amputations of root ends, and similar work the dentist is within the realm of minor surgery, and every precaution of a major operation is prerequisite.

To approach a little closer to work which is exclusively dental, we may touch upon prophylaxis, from the simplest form of cleansing to the most radical treatment of extreme pyorrheal conditions. Here let me remind you that it is not the germ alone which produces disease, but there must likewise be a favorable environment, plus a lack of vital resistance. Thus it is quite conceivable that the cleansing of a set of teeth which seem merely slightly in need of prophylactic attention, the gum tissues appearing healthy, may yet so contaminate the instruments used that if employed without due precautions in another mouth where the individual's vital resistance to germ propagation is lower, we might actually infect the tissues, so that while ostensibly cleansing the teeth we are really inoculating the patient with a pus disease. It is perhaps difficult to prove this, but I have little doubt that many cases of simple pyorrhea have thus originated. There is but one solution to this problem: All instruments used by dentists in contact with soft tissues should be sterilized not alone after use, but again just prior to their next employment. Is this done?

I come now to the *bête noire* of dentistry—root-end disease. How much of this is inevitable? How much is actually the result of inoculation at the hands of the dentist? I cannot answer for the work of other men, but with sadness I say that I believe that very much of this class of trouble with which I have had to contend has been produced by myself.

If a pulp be found freshly exposed, is treated and removed, and immediately afterward the tooth becomes sore to the touch, where lies the fault? Undoubtedly a large percentage of these results are due to incomplete removal of pulp tissue, but I think not all. Some at least are the natural consequence of using canal instruments which carry germ life. This leads me to remind you of the example cited earlier in this paper. A pus-producing germ introduced into dead or dying blood is liable to cause an abscess. After removing a pulp we necessarily have ruptured bloodvessels at or near the root end, and an extravasation of blood from those vessels. This blood if uncontaminated should be absorbed, but if a pus organism reaches that area, what can we expect except germ propagation, both the pabulum and the environment being favorable? Is it not probable—nay, is it not certain, that at least some of our difficulties have thus arisen? At least is it not desirable to feel assured that the onus of this burden be removed from our shoulders? Would it not be pleasanter to feel ourselves above suspicion? Is it not disheartening to have a patient suffering with a sore tooth say, "It is not your fault, doctor; it is the tooth"—when within your own conscience you are asking yourself, "Is it not my fault? Am I sure that those broaches were uncontaminated?"

The canal broach is at once the most difficult instrument to thoroughly sterilize, while being the one of all used by dentists which most requires aseptic precautions at our hands. Some men have told me that they avoid all difficulty by invariably using a new broach. This only accentuates the fact that many den-

tists have not deeply studied the question of contamination and of sterilization. There is probably no package of so-called "new broaches" obtainable of any manufacturer from which cultures cannot be obtained. Some of the most virulent of bacteria are secreted under the scales of the cuticle of the hands. For this reason the most careful surgeons now, after a thorough scrubbing of the hands and arms, immerse these members in a solution of potassium permanganate, which is allowed to dry, and it is with these dyed hands and arms that major operations are conducted. Why? Because it has been found that even persistent scrubbing with brushes and ethereal soaps do not render hands sterile. It is therefore safer to cover the whole hand and forearm as with a glove, with this powerful germicide. From this picture let your mind's eye wander to the factory in which these "new" broaches are made and put into packages. Imagine the dust-laden atmosphere, the machinery thoroughly oiled, the men's hands dirt-begrimed, the hands of those that put these broaches into packages, the paste-pot and brush with which the labeling is done, and then ask yourself if from such a source a safe broach may come?

No! It behooves us at this late day to admit that in the one direction where dental asepsis is most needful we have been sadly deficient. We have not, at least the majority of us have not, taken all the precautions which might be taken. At least it has not thus far been advised in print that all broaches should be sterilized just prior to use, and that they should be taken direct from the sterilizer to the mouth.

In a previous paper on this subject, read before the Wisconsin State Dental Society, I recommended that a sterilizing medium should be found in which broaches might be constantly kept and from which they might be taken just as needed. Personally I had failed to find any such medium, owing to the fact that it is of equal importance that the broach should in no way be attacked by the sterilizing agent, as in that case there would be danger of breakage and the consequent lodgment of the broken end within the canal. One gentleman suggested that broaches could be kept aseptic by immersing them in absolute alcohol. Elsewhere I have seen a statement that absolute alcohol is not so good a germicide as alcohols of lower grade; indeed this last writer found absolute alcohol of only slight value as a germicide. If a lower grade of spirits be used, would not the presence of water therein endanger the integrity of a steel broach? I would like to hear some discussion upon this point. Can we find a good germicidal fluid in which steel instruments may be kept without injury and with assurance that asepsis will be attained?

Pending such discovery, I venture, with some hesitation, to introduce to your attention a mode of procedure which at least promises a solution of the sterilization problem in so far as it relates to canal instruments. I say that I do this with some hesitation, because I feel that it would have been wiser to withhold my announcement until by my own experiences I could speak with more assurance. But your executive committee urged me to appear before you this month, and consequently I am forced to admit that I am addressing you largely theoretically, and I shall reserve the right to make a more specific report later, after due time for proper study of the method and for perfecting the sterilizer which I show you.

My idea, then, is that we should have a sterilizer especially adapted to the requirements of the dentist in his root-canal work. To this end I have had constructed an apparatus which somewhat resembles a student's lamp in shape. There is a stand, carrying at one end a Bunsen burner. From the center of this stand is an upright, and on this a revolving arm at each end of which is carried a copper boiler. The broaches are placed in one boiler and thoroughly boiled, after which the arm is revolved, bringing the other copper boiler over the Bunsen flame, which is kept turned low. Each broach is taken from the boiler with a pair of tweezers and placed in a carrier,

which should preferably be made entirely of metal, so that it also may be sterilized. This, however, is only a sentimental precaution. If the broaches are taken direct from the boiler, and the barbed end is not allowed to touch anything before being used, there is practically no danger from contamination through its contact with the carrier. A broach should be used in a canal only once, after which it should be removed from the carrier and dropped into the second boiler, thus assuring immediate sterilization. If we start with half a dozen broaches sterilized in the first boiler, by the time we have used them all, those in the second boiler will have been sterilized.

With the ordinary Donaldson bristles, made of steel, the usual soda and water must be used for sterilization, but these boilers have been made of copper for a definite purpose. Barbed broaches are now procurable of The S. S. White Co., made of 18-karat gold, and I have had some especially made for me by the Consolidated Company of iridio-platinum, 40 per cent. of iridium being used. As to the value of these I cannot at present report definitely, as my experience with them has been limited, only a single case of pulp-exposure having passed through my hands since obtaining the broaches. However, if these broaches prove efficacious as pulp-eradicators, we then will have the opportunity of sterilizing our gold or iridio-platinum broaches, by boiling them in sulfuric acid solutions, and these solutions may be of sufficient strength for the presence of the sulfuric acid on the broach to materially aid the opening of small canals. Even if the barbed broaches of these pure metals do not serve our purpose, I am convinced that unbarbed broaches of iridio-platinum boiled in sulfuric acid just before use will greatly aid us in our future work of dressing pulp-canals.

There is much more that might be said, but this paper is chiefly intended to introduce a discussion along the proposed new lines, rather than to present any final data. The new thought is, should not we sterilize broaches immediately before and immediately after their introduction into root-canals? And for this purpose will not a sterilizer that may be placed immediately at the hands of the dentist prove useful?

With such a sterilizer, will it not be possible to conduct our prophylactic work in a similar manner? Will it not be an advantage to operate on pyorrheal and other unhygienic conditions with instruments fresh from a table sterilizer?

(To be continued.)

THE DENTAL COSMOS

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Devoted to the Interests of the Profession.

EDITED BY

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PHILADELPHIA, MARCH 1905.

EDITORIAL DEPARTMENT.

PUBLIC DENTAL SERVICE.

AMONG the incidents which indicate the increasing importance of dentistry as a department of the healing art, the attentive observer cannot fail to have noticed the growing interest which attaches to the relationship of dentistry to the public health. The most evident expression of this relationship at present is doubtless the movement which has for its purpose the dental care of those who are employed in the defensive arm of the governmental service. The need of efficient dental care for our soldiers and sailors has come to be recognized and demanded, not only by the dental profession, but largely by the legislative and administrative departments of the government. The present status of the problem is, therefore, not to secure the recognition of that need, but how to adequately meet it, and it is around this latter phase of the question that the present activity with reference to securing commissioned rank in the army and navy service for those having practical charge of the dental health of the army and navy is centered.

It is the belief of those most competent to judge that the best results in the way of dental service in the army and navy can be obtained by the appointment of a corps of dental surgeons with adequate rank, and to that end the efforts of those interested in this movement are directed. It is to be hoped, therefore, that whatever influence can be exerted by the dental profession in America will be brought to bear upon their representa-

tives in Congress with a view to securing their co-operation in the passage of the bills now pending, and thus make the establishment of a commissioned corps of dental surgeons for both army and navy practically effective. Those who are interested in this movement should communicate with the chairman of the committee appointed by the National Dental Association to look after this matter, Dr. M. F. Finley of Washingon, who is in the best position to give such direction as will make the effort of individuals most effective. Indeed, individual effort can only be made effective by co-operation with the properly constituted committee; otherwise, with the best intentions in the world, individual effort may be misdirected and tend toward failure rather than success.

The question of the appointment of dental surgeons in the army and navy is but a minor division of a still broader question of the relation of dentistry to the state, and this question is not a local but an international one—a question which is arousing the interest of progressive governments throughout the world. France, England, Germany, Spain, and Argentina are all at present concerned with various phases of the same problem, and with varying degrees of present success. There can be no doubt as to the ultimate issue, for the reason that the intrinsic importance of the fundamental question is one which is certain to make itself felt and to command increasing recognition until adequate provision has been made for the relief of those engaged in the defense of their country from the tremendous source of disability which the diseases of the mouth and teeth are known to constitute.

There are other directions in which this fundamental problem of the relation of dentistry to the state is making itself felt. First, the inspection and care of the teeth of children in the public schools. It is becoming generally recognized by physicians and those concerned in the welfare of public school children that an enormous amount of disability and interference with the proper conduct of educational work can be definitely traced to defective dental apparatus and the various sequelæ which these disorders entail. Already in numerous localities the care of the teeth of public school children is receiving serious consideration and steps are being taken for the relief of dental disorders. Again, a still further important field for the application of the same idea is the treatment of the inmates of homes, reformatories, and various eleemosynary institutions for the purpose of improving the health status of those who are charges upon the state or of private benefaction. Many of these institutions already have dentists regularly appointed to care for the teeth of the inmates. Quite recently the Indian school at Fort Totten, North Dakota, has appointed a dentist, Dr. W. J. Browley of Devil's Lake, N. D., to

take charge of and care for the teeth of the Indian youth undergoing instruction there. This is a step in the right direction. The charitable and humanitarian as well as the utilitarian value of all of this class of work needs no argument to support it. Everyone familiar with the facts, and every reasonable thinking individual when the facts are presented, will agree as to the value of such service.

There is a scientific aspect to the question which is well worthy of consideration. No field of study can be more fruitful of valuable scientific results, especially from the standpoint of clinical dentistry, than the recorded and tabulated results of observation and of work among the class of patients who are recipients of the type of service here under consideration. The benefits which would accrue to dentistry as a whole would be immeasurably great from the publication of carefully digested records of the observations made and the work performed by those who have this class of work in their charge. It is to be hoped that in the course of time the literature of dentistry may be enriched by contributions emanating from these sources. The widespread interest which the various phases of this problem has aroused and the international character of the problem as a whole made it a subject of especial consideration by the Fourth International Dental Congress, and it will doubtless continue to be a vital question for consideration by succeeding international dental congresses. In the meantime it has been made one of the objects of study by the International Dental Federation, through which latter source the collating and digesting of much of the data pertaining to the relation of dentistry to the state will be made available for the instruction of the dental profession at large. At the Fourth International Dental Congress a resolution looking to a larger development of the character of service which dentistry renders to the state was presented by Professor Godon, honorary president of the International Dental Federation, and was unanimously passed by the congress. We append the resolution, commending its provisions to the thoughtful consideration of our readers, and especially to the attention of those in the administration of all institutions having state or municipal relations:

> RESOLVED, That public dental services should be organized in hospitals, schools, factories, etc., and wherever the poor are medically treated, that they may receive not only urgent medical and surgical attention (whether as to dressings, consultation, temporary fillings, or extractions), but that so far as possible thorough treatment be given to restore the dental organs by means of the resources which modern dentistry affords and such as is employed in the private practice of dentistry and as is the case in the dispensary practice of general medicine and surgery. That is to say, not emergency treatment only, but thorough dentistry is demanded for the poorer classes.

There is every reason, if medicine can furnish to the worthy poor, and to those who are dependent upon the state for medical aid, the best service which the science and art of medicine is capable of rendering, that dentistry should not be behind in this matter. We should not be content to temporize with the treatment of eleemosynary cases, but see to it that the best class of dental service is rendered. This, we take it, is the *motif* of Professor Godon's resolution, and is the ideal which we think should be practically realized in the service of dentistry to the state.

THE LEWIS AND CLARK DENTAL CONGRESS.

The promises made by the General Committee of Organization regarding the magnitude of this great dental meeting and the preparations made for their fulfilment have now reached such a stage of advancement as to be practically assured. The state dental associations of Oregon, California, British Columbia, Washington, Idaho, Montana, Utah, Nevada, besides three local dental associations of California, are all co-operating in the movement to make this the most important dental meeting ever held upon the Pacific coast. Membership, while it will be largely drawn from territory west of the Rocky Mountains, is not limited to any locality, and the Committee has expressed an earnest desire to secure the co-operation of as many colleagues from the East as they can possibly secure, not only to add to the material success of the congress, but that the ties of professional affiliation between these two great sections of our country may be more closely drawn.

The program will be extended over three days. Many interesting papers are already promised. The clinics will be numerous and interesting, and there will be exhibits and demonstrations from manufacturers arranged in their separate booths. The meetings will not be held in sections, but all of the features of the meeting, including essays, clinics, and exhibits, will be under one roof in a hall capable of seating five thousand people, near to the center of the city and convenient to all points.

The time of the meeting will be July 17th to 20th, immediately following the annual session of the American Medical Association. These three features—namely, the Western World's Exposition, May 31st to October 31, 1905, commemorating the Lewis and Clark centennial, the Lewis and Clark Dental Congress, and the meeting of the American Medical Association just previous thereto—collectively present a group of attractions

which should lead a fair representation of dentists from the Atlantic seaboard and the middle states to spend their vacation in Portland. Under ordinary circumstances the trip to the Pacific coast from the Atlantic seaboard is something of a formidable undertaking, not only because of the distance, but because of the expense of transportation. The reduction in the cost of transportation in connection with these events is, however, such as to offer a favorable opportunity for those who have never come into contact with the attractive features of the great West, or those who have an imperfect idea of the magnitude of this great country, to secure an enlarged conception of these features at a minimum of expense. The round-trip rates for transportation from Chicago are fifty-six dollars; from the Missouri river, forty-five dollars; from territory on the Pacific coast, one-half the regular rate. Tickets good to return in ninety days. These are the lowest railroad rates yet offered.

There are four thousand dentists practicing in the territory embraced by this congress, and no such favorable opportunity has ever been presented for the dental practitioners of the East to make their personal and professional acquaintance.

A Correction from Dr. W. D. Miller.

We regret the occurrence of two errors to which Professor Miller has called our attention in the printing of the first portion of his paper entitled "A Study of Certain Questions Relating to the Pathology of the Teeth," in our issue for December 1904. On page 984, the numbering of the curves in the diagram there shown should read from below upward in the following order: 1, 3, 2. On page 987, the two photographs Figs. 2 and 3 have been transposed, the inscription in each case applying to the other illustration.—Ed. Cosmos.

BIBLIOGRAPHICAL.

L'Anesthésie Locale pour l'Extraction des Dents.

Local Anesthesia for the Extraction of Teeth. By Dr. E. Sauvez, Dentist of the Hospitals of Paris, Professor at the École Dentaire. With a preface by Professor Reclus, of the Paris Faculty of Medicine. Paris: Vigot Frères, 1905.

This exhaustive treatise on the subject of local anesthesia is already familiar to the number of practitioners who were present at the Fourth International Dental Congress, where the author read the painstaking paper of which the book now before us is an exact duplicate. The prefatory introduction by Professor Reclus is ample proof that this eminent surgeon—the champion of local anesthesia for major operations—agrees unreservedly with the views and methods advocated by Dr. Sauvez as the result of his long experience with the agent in operations about the mouth and adjacent areas.

In his introduction the author states that cocain has not found favor with the American or English practitioner—a fact which he attributes to the many accidents which followed the use of cocain shortly after its introduction by Koller of Vienna in 1884, at a time when its physiological properties were but incompletely known. That at the present time the agent should not be as generally employed among us as would be warranted by its record in the hands of cautious and progressive men is a puzzle which the reviewer cannot attempt to solve—especially as Reclus has performed under its influence over eight thousand operations without the slightest post-anesthetic accident. When used in the proper dose and when all necessary precautions have been observed, the agent is one which will render invaluable service to the dental surgeon. The experience of many a man with cocain has been most unsatisfactory, to say the least; but, Did he limit the dose to less than 3 centigrams? and, above all, was the percentage of the solution employed that which both Reclus and Sauvez invariably employ? The ill effects of cocain solutions injected into the soft tissues as observed in many cases on record were due, in our opinion, also to causes other than the toxicity of the agent. The condition of the area of injection, whether septic or aseptic; that of the syringe, whether properly sterilized or just merely "cleansed"; and the addition to the solution of a number of agents presumably to counteract the poisonous effects of the anesthetic have had without doubt a prominent share in inducing post-operative inflammation.

That cocain is contra-indicated in certain cases no one will gainsay, but that it is not indicated in a large proportion of oral operations cannot be sustained in the face of the evidence as offered by the two above-quoted authorities.

In the 186 text pages the author discusses local anesthesia in all its phases; compares the relative value of general and local anesthesia; studies critically and most thoroughly the dangers and inconveniences of general anesthesia, the advantages of general anesthesia, the

dangers and inconveniences of local anesthesia, the advantages of local anesthesia, the methods of inducing localized anesthesia by methods other than cocain and by refrigeration, the physiological properties, toxicity, technique of administration, strength of solution, etc., of cocain, tropacocain, and eucain, together with an outline of the method introduced by Schleich, a detailed account of the precautions to be employed prior to the injection, etc.

The chapter devoted to the study of the physiological properties of cocain is one of the utmost importance, as therein the author discusses in a most comprehensive way the effects which follow the injection within the tissues of small, medium, and large doses of the anesthetic. He calls particular attention to its powerful vaso-constrictive action and to the rise in blood pressure consequent thereto. To this vaso-constrictive action has been attributed, at least in part, the peripheral anesthesia induced by cocain; but with this view the author does not concur, for, as was pointed out by Arloing, the cornea can be anesthetized with cocain even after the sectioning of the cervical sympathetic, which, as is well known, produces a marked vaso-dilatation of that region. The theory advanced by Laffont and Arloing to the effect that cocain is of the nature of a "sensitive curare" is not a sustainable one in Dr. Sauvez' opinion. Cocain has been found to have no selective action upon any form of protoplasm, whether it be muscular nervo-motor or nervo-sensitive. When injected into a nerve trunk it brings about insensibility of the entire region supplied by it—a result which, of course, entirely upsets Laffont and Arloing's views.

Regarding the strength of the solutions, we find that the author agrees *in toto* with the views of Reclus—namely, that the toxic effects of cocain depend not only on the quantity of the alkaloid injected, but likewise and to a great extent upon the strength of the solution. Starting with the 20 per cent. solution, Reclus has gradually decreased the percentage until at the present time he employs solutions of from ½ to 1 per cent., the maximum, with results all that could be desired. For the extraction of teeth a 1 per cent. solution is the one the author invariably employs, and the dose he thus administers is only upon exceptional occasions made to exceed 1 centigram.

Dr. Sauvez' treatise is, in the reviewer's opinion, the most exhaustive contribution to the literaure of cocain in dentistry. It embraces within its scope all that which is at present known of the agent, its properties, and its applicability to dental operations. He has treated the subject from the standpoints of the therapeutist, the physiologist, the surgeon, and the dentist, in a clear and forceful style and in a way which renders the reading of the work both interesting and instructive.

J. E.

REVIEW OF CURRENT DENTAL LITERATURE.

Conducted by JULIO ENDELMAN, D.D.S.

[*Archives de Stomatologie*, Paris, July 1904.]

EXTENSIVE NECROSIS OF THE MANDIBLE CAUSED BY PENETRATING CARIES OF A DECIDUOUS MOLAR. By Professor Broca.

Caries of the teeth may constitute at any period of life the cause of severe deep-seated infections. The mandible becomes the seat of carious complications with far greater frequency than the maxillæ.

The case described by the author is that of a little girl aged four, presenting a slight swelling of the extreme left of the body of the mandible in the immediate vicinity of the mandibular angle. An examination of the external soft tissues pointed to osteitis, there being, however, no symptoms indicative of abscess formation. The intrabuccal examination showed the absence of the lower left first and second deciduous molars, their former positions being outlined by two round, red swellings. There was also some trismus, due no doubt to irritation of the masseter muscle by the existing osteitis in the region of its attachment.

About eighteen months prior to the examination of the case by Professor Broca the child suffered from severe toothache, which had necessitated the extraction of the two molars. This radical measure, however, did not result in abatement of all the symptoms present, such as reflex pain in the ear, difficulty in carrying out the movements of the mandible, and intermittent swelling of the tissues around the angle of the mandible superinduced by climatic changes. A careful study of all these symptoms and the circumstances under which they made their appearance led Professor Broca to the conclusive diagnosis of mandibular necrosis, which was fully confirmed by the surgical operation performed by him shortly afterward.

In this connection the author calls attention to a very important point bearing directly on the surgical treatment of necrosis, particularly of the mandible, namely, that operative intervention should be postponed until the sequestrum is fully formed and the line of demarkation between the live and dead tissue fully discernible. If the operation is performed too soon it may be eventually necessary to operate anew to remove the further ravages of the disease; otherwise in the primary operation too much sound tissue may be removed in the effort to prevent the possibility of recurrence. Of course, in the case of mandibular necrosis the only sign indicating the formation of the sequestrum is the mobility of the disorganized region. In this particular instance, however, while no marked mobility could be detected, the diagnosis was made easy by the presence of other symptoms and by the fact that in young individuals denuded areas of bone very soon become definitely separated from the adjacent sound tissue. The operation was successfully carried out, and a sequestrum was removed from within the body of the mandible and extending from the canine tooth to the angle of the mandible, and another from the ascending ramus measuring four centimeters in length by one and a half centimeters in width.

This report should be made the subject of careful consideration by those entrusted with the care of children's teeth, part of whose duty should consist in instructing parents on the dangerous possibilities of allowing carious deciduous teeth to remain untreated. As pointed out by Professor Broca, the dangers of deep-seated infections from carious teeth are greater in the young, owing to the conformation of the root, the wide apertures of the apical foramina, and the great vascularity of the alveoli and jaws. Apart from the detrimental effect upon the arrangement and soundness of the permanent organs, caries of the deciduous teeth may lead to systemic disturbances of varied degrees of intensity, such as osteomyelitis, necrosis, cervical adenitis,

disturbances of the digestive tract, reflex disturbances of the eye and ear, etc. Reports similar to the one under consideration, if brought to the attention of parents unmindful of the possible consequences of carious teeth, will do more, in the reviewer's opinion, toward their education in dental matters than anything that might be devised for the purpose, as their attention will doubtless be attracted by the description of such cases from actual practice rather than by isolated facts picked out at random from the literature of the subject.

[*Le Laboratoire*, Paris, January 1905.]

METHOD OF CONTOURING LARGE PORCELAIN INLAYS. By Dr. Boitel, Vevey, Switzerland.

The method described by the author is especially applicable to the construction of inlays for large cavities in molars and bicuspids. After obtaining an impression of the cavity and adjacent tooth-surface with any of the materials suitable for the purpose, a plaster cast is prepared therefrom in the usual way. A platinum sheet of suitable size and thickness is now adjusted against the walls of the cavity as in the usual process of matrix construction, and a hole is cut out in the basal wall of the matrix. After ascertaining that the matrix is in the right position and accurately adapted to every part of the cavity, it is filled with wax to represent the original contour of the tooth. The correct relation of the wax inlay to the antagonistic teeth is obtained by the aid of a "bite" precisely in the same way as for the construction of crowns and bridges. The wax will represent the facsimile of the porcelain inlay when finished—provided, of course, that all details be carried out with the utmost care and attention. Upon the finished wax filling another piece of platinum foil of proper size and thickness is now carefully adapted so as to cover its entire surface up to the margins, where it should be made to come into close contact with the edges of the matrix.

The whole is then carefully removed and invested in plaster to which some asbestos is added. The wax is removed from the platinum shell by means of hot water, or preferably by immersing the investment in boiling water. This is easily accomplished, the melted wax escaping through the hole made for the purpose in the base of the matrix. If necessary, the last vestiges of wax may be removed by means of a small camel's-hair brush saturated with chloroform. With all these preliminaries accomplished we now begin the task of filling up the shell with the body mixed thinner than for the making of inlays by the usual method, as it is imperative that every corner and crevice should be well penetrated by the porcelain. The excess of humidity should be gradually removed by means of spunk, blotting-paper, or any other absorbing material.

Having concluded this phase of the work, the inlay is now ready for the furnace. As in the case of ordinary inlays, it will require several bakings, the investment being removed before the last firing. The platinum is now removed and the inlay cemented into place with zinc oxyphosphate.

This method, while perhaps more complicated than the one generally in vogue at the present time, possesses the valuable feature of accuracy, the inlay restoring the exact contour of the tooth without the necessity of grinding or making any alteration of form after it is cemented in the cavity. The principles of this method are practically identical with those of the method suggested by Dr. C. L. Alexander of Charlotte, N. C., for the making of gold inlays, as published in the Dental Cosmos for October 1896, page 850, the only detectable difference being that due to the dissimilar nature of the materials employed—porcelain in Dr. Boitel's plan and gold in Dr. Alexander's.

[*Archives de Stomatologie*, July 1904.]

ON THE NATURE OF ULCERATIVE STOMATITIS AND ULCERATIVE ANGINA. By M. Grenet.

According to Vincent there are, from a bacteriological viewpoint, several types of ulcerative stomatitis, viz, the polymicrobic form, the pyogenic form, the fuso-spirillary form. Vincent is of the opinion that the fuso-spirillary form only has always the same clinical signs, viz, ulcerations with a grayish exudate, fetidity, adenitis, fever. The other types have variable symptoms, which, however, may be at times similar to those of the fuso-spirillary form.

Believing that the term ulcerative or ulcero-membranous stomatitis should be applied ex-

clusively to the type studied particularly by Bergeron and characterized by precisely the same symptoms which Vincent has found in the fuso-spirillary variety, the author of the present communication made a bacteriological examination of a number of cases diagnosed as ulcerative stomatitis and also of several cases of Vincent's angina with symptoms very similar to those observed in connection with ulcero-membranous stomatitis. In six cases of stomatitis, some with tonsillar ulcerations and some without, and in five cases of tonsillar involvement without stomatitis, the author found fusiform bacilli in symbiosis with spirillæ, in some cases associated with other micro-organisms, while in others they were alone. These results, agreeing with those of previous investigators, and notwithstanding the small element of doubt which as yet remains unsolved relative to the pathogenic rôle of the fusiform bacillus, point out the possible truth that ulcero-membranous stomatitis and Vincent's angina constitute the same type of bucco-pharyngeal infection localized in different areas.

[*Deutsche Monatsschrift für Zahnheilkunde*, Berlin, January 1905.]

HYDROGEN DIOXID IN THE TREATMENT OF SENSITIVE DENTIN. By Dr. Viggo Andresen, Copenhagen.

The author some two years ago pointed out the availability of hydrogen dioxid in the treatment of hypersensitive dentin, and urged his colleagues to give the preparation a careful trial. He has found that a small amount of a 30 per cent. solution will eradicate the pain incident to the excavation of the dentin, although in this connection it is interesting to note that it either produces the desired result in a most complete way or does not act at all. It is especially efficacious in cervical cavities, in which at times the pain of excavating is so severe that all agents at our command may be exhausted without success. It is likewise useful in the preparation of retaining points and grooves. It should not be used in close proximity to the pulp, because of its extremely irritating action, but may be applied in cavities near the gum, for even if it should come into contact with the gingival tissue the result will soon pass off without any inconvenience to the patient. It has also been found useful for relieving the pain incident to the operation of grinding teeth, either to reduce undue elongation or for the preparation of abutments for crowns and bridges.

[*l'Odontologie*, Paris, January 30, 1905.]

THE SEVERAL USES AND MODES OF EMPLOYMENT OF ETHYL CHLORID IN DENTAL SURGERY. By L. Dalban.

The author begins his communication by saying that neither the advocates of general anesthesia nor those of local anesthesia have as yet offered sufficiently convincing arguments in favor of their respective methods. There is not at present an anesthetic suitable for all operations in the domain of dentistry. The ideal agent would be the one offering the greatest number of advantages for the greatest number of cases. Ethyl chlorid has been made, in recent years, the subject of numerous interesting communications. It may be employed as a refrigerating agent in certain cases, such as the extraction of teeth and a number of operations in the realm of minor surgery, *i.e.* incision of abscesses, scarification of the gums, etc. It is likewise applicable in certain cases of hypersensitivity of the dentin in which it is practically impossible to proceed with the excavation of the cavity.

But it is particularly for the extraction of teeth that M. Dalban recommends the employment of ethyl chlorid, and while the technique of administration is by no means complicated, yet it is so frequently faultily carried out that many failures may be attributed to this cause. A very important point in this connection is never to apply the agent upon a wet surface. The gingival area upon which the stream is to be directed should be thoroughly dried with cotton wool, as saliva interferes with the good work of the anesthetic. It is for this reason that it is often difficult to anesthetize any one of the mandibular teeth, although the salivary fluid may be easily excluded by means of cotton tampons placed against the openings of the various salivary ducts. After this preliminary precautionary measure has been carried out the application of the agent is begun. It is of the utmost importance that the agent should reach the tissues in the state of vapor, as the result is less satisfactory when it strikes the gum while yet in the liquid form. The application should be made against the area overlying the root

upon both the external and internal surfaces. Many operators withdraw the anesthetic as soon as the surface of the mucous membrane becomes blanched, from fifteen to twenty seconds after the beginning of the application, with an almost complete failure as the result. The spray should be kept up until long after the blanching of the gum, in order to affect the deeper structures. The analgesia induced with ethyl chlorid lasts from thirty to forty seconds. In the case of teeth the seat of deep caries and pulpitis the contact with the cold vapor will induce violent pain. Such teeth should be protected by filling the cavity with cotton, or better yet with gutta-percha. The same technique of application holds good for such small operations as the lancing of abscesses, scarifications, etc.

The author then takes the method advocated by M. D'Argent for the treatment of hypersensitive dentin. It consists in introducing into the cavity a pellet of cotton saturated with ethyl chlorid, and directing against the pellet while *in situ* a spray of the same agent for about twenty seconds. The introduction of the pellet is followed by severe pain which lasts for about five seconds. The cavity may now be excavated for about one minute without causing any pain. This method is in the reviewer's opinion a dangerous one, and if employed at all should be limited to very shallow cavities. The application of extreme temperatures to the teeth, even in the case of healthy ones, is followed by pulp disturbances of varied degrees of severity, and occasionally by inflammation leading to death of the organ. It is certainly not as suitable for this particular purpose that ethyl chlorid should be recommended, particularly in view of the fact that for the treatment of hypersensitivity it may be substituted by agents possessing greater advantages and which do not endanger the life of the pulp.

Regarding the use of ethyl chlorid as a general anesthetic, we find that the essayist advocates its employment in lieu of nitrous oxid, ether, or chloroform. He administers it according to the method advocated by Malherbe and Rubinovitch, which consists in applying directly upon the face—covering the mouth and nose so as to exclude all air—a compress saturated with from half an ounce to one ounce of the agent, and held in the hollow of the operator's right hand. Very often the patient is fully anesthetized in from fifteen to twenty seconds and remains unconscious for from one and a half to three minutes. The dose necessary to anesthetize an adult may vary from 3 cc. to 10 cc. It is practically a safe agent. Only one death has been recorded out of a series of 16,000 cases, but at the post-mortem in the fatal case it was found that the patient had suffered from fatty degeneration of the myocardium and arterio-sclerosis.

Another important advantage which should be pointed out is that ethyl chlorid does not cause vomiting even when administered upon a full stomach. This constitutes an advantage of no minor importance, as in dental offices it is frequently the case that anesthetics are administered after meals. Neither age nor diseases of the respiratory or circulatory systems are contra-indications to the use of ethyl chlorid. The author also refers to the method of mixed local and general anesthesia with ethyl chlorid as advocated by Dr. Pont. The method consists in placing the patient under the first period of general anesthesia by directing him to take a few deep inspirations while the spray is being directed against the gingival area, with the view of eradicating the sensitivity of a limited region.

[*Dental Summary*, February 1905.]

PRESSURE ANESTHESIA AND IMMEDIATE ROOT-FILLING WITHOUT REMOVAL OF PULP TISSUE. By T. S. Phillips, Buffalo, N. Y.

The author states that he has experimented and studied for five years the question of pulp-devitalization with the purpose of devising if possible a "method of treatment which would do away with arsenic, which in the hands of many is a menace to human life; its action when applied even carefully causes not only the death of the nerve, but renders the tooth an absolute foreign body by destroying its periosteum, necrosing the bones of the jaw, causing epulis and often blood poisoning. We have all seen these effects from its use. Its days of usefulness are past as a nerve-destroyer, for by modern means and pressure anesthesia we are enabled to perform any and all operations heretofore performed without it, and to save the periosteum of the tooth

from destruction, which it must be admitted is an important element."

From the above quotation we surmise that the experience of the writer with arsenic must have been exceptionally unfortunate, as it by no means agrees with that of the majority of practitioners who have been using this agent since its introduction by Spooner in 1838. It is, of course, a well-known fact that arsenic injudiciously used may bring about serious inflammatory phenomena of the pericementum, and, in severe cases, of the alveolar walls and possibly of the mandible; but to state that arsenic even when applied carefully causes not only the death of the "nerve"—we presume that by "nerve" the writer implies the pulp of the tooth—but renders the tooth an absolute foreign body by destroying its pericementum, shows conclusively that the author is familiar neither with the agent nor with the technique of application for the devitalization of the pulp. When carefully applied it does not destroy the pericementum nor does it involve either necrosis of the mandible or blood poisoning, but it does bring about that degree of paralysis of the elements of the pulp necessary in order to remove the pulp without undue suffering to the patient.

"We have all seen these effects from its use," says Dr. Phillips; and to this we say, 'Yes,' in cases in which the dose of arsenic introduced into the pulp-cavity or root-canal has been excessively large and when the application has been left within the tooth without properly sealing the cavity with either of the zinc cements; but we have not all seen these effects when used according to the methods in vogue among dental practitioners familiar with the properties and action of arsenic and its correct application.

It would have added a great deal to the value of the paper had the essayist appended to it a detailed list of cases in which arsenic has produced the detrimental results which he presumes invariably follow its use for the purpose under discussion. The mere fact that he says so is not sufficient evidence, particularly in view of the fact that the experience of thousands of dentists, the reviewer among them, is otherwise.

The purpose of calling attention to the errors of fact in the opening quotation is mainly to counteract the effect which it might have upon those not thoroughly familiar with the therapeutics of arsenous oxid.

[*Transactions of the Odontological Society of Great Britain*, December 1904.]

ACTINOMYCOSIS OF THE MOUTH AND FACE, WITH THE REPORT OF TEN CASES. By Thomas H. Kellock.

The author states that the name actinomycosis was given to this disease because it was the prevalent idea that the specific fungus could be recognized microscopically by its "starred" or "ray-like" appearance, but that it has since been found that there are several varieties of fungi or streptothrix that may act as the cause. These fungi are found in twisted masses of mycelium and are only visible when suitably stained, the peculiar appearance of ray formation being due to refraction of light.

The author points out the necessity of suitably staining the specimens to be examined, as otherwise, even although the streptothrix be present, the result may be negative. Another important point to bear in mind in this connection is that the ray form may be broken up, the evidence of it being visible in the unstained specimen in the shape of minute elongated glass-like fragments scattered among the pus cells. It is pointed out that in cases where acute suppuration has supervened difficulty may be experienced in finding the streptothrix even after staining, and that by repeated examinations only it may be found at last. The filaments of the streptothrices stain well by Gram's method.

The fungus was formerly supposed to flourish almost exclusively on straw or hay, and the chewing of these by man or beast was looked upon as the usual mode of its entry into the body. The occurrence of the disease among people of many and varied occupations seems to indicate that the organism has a much wider distribution, and that in the larger number of cases it enters the body through the respiratory or alimentary tracts.

The author draws attention to one peculiarity of this disease, namely, its disposition to ignore anatomical boundaries and spread beyond the limits of the organ primarily affected. It is doubtful if it ever affects an unbroken surface.

The clinical history of actinomycosis is important, and when a patient presents himself with a sinus leading to a patch of bare bone in the mandible, with a history that it has persisted for some time, in spite of removal of

the tooth supposed to be the cause of the trouble and that *throughout the whole course of his ailment there has been little or no pain*, the nature of the disease may be a streptothrix infection, although it is only through repeated microscopical examinations that the diagnosis may be confirmed. The organism may enter the body through a break in the continuity of the gum, carious teeth, or the ducts of the salivary glands. The latter avenue, although a common one in the cases reported by the author, is one that hardly ever seems to have been remarked upon.

The abscesses when they reach the surface are as a rule chronic or subacute. They first manifest themselves as a dusky hardness of the skin, unaccompanied as a rule by pain or rise of temperature, and only causing inconvenience when by infiltration they impair the function of muscles or other structures. One or more soft spots appear in the indurated area, and between these projecting soft spots the skin appears to be drawn in, giving rise to a typical appearance. If left alone these soft spots open spontaneously, and if several do so the swelling assumes a sort of honeycomb appearance. If they are incised, one is often almost disappointed at the very small quantity of pus that escapes compared with what one had expected from the size of the swelling. These soft spots do not as a rule communicate directly with each other, and thus several incisions may be required. In the pus that escapes there can often be recognized the small, notably spherical masses characteristic of the affection—sometimes bright yellow sulfur grains, as they have been called, sometimes a dull yellowish-white, and sometimes, again—an important fact to remember—very small and quite colorless. In the latter case they may be recognized by allowing some of the pus to flow slowly down the side of a test tube, and in a good light the minute elevations may be seen adhering to the glass.

Cases complicated by secondary infection leading to acute suppuration are difficult to diagnose, as the true nature of the affection may be overlooked from the fact that the patient will be suffering from all the symptoms of an ordinary septic abscess.

As to the treatment it is said that, the disease being a communicable one, our efforts should first be in the direction of preventing its spread. The softened spots should be incised and scraped freely, all that is possible of the affected tissues being removed. Large doses of potassium iodid should be administered, beginning with a dose of 15 grains three times a day, increasing it gradually to 50 or 60 grains three or four times in the twenty-four hours, together with three or four minims of liquor arsenicalis with each dose of the iodid. The prognosis under this treatment is good.

In conclusion the author describes ten cases of actinomycosis from the out-patient department of the Middlesex Hospital.

PERISCOPE.

Plate-Polishing Compound.—To put a high polish on a plate use aqua ammonia in the chalk instead of water; the result will be found satisfactory. After polishing plate, wash it in tepid water, and dry. Then go over plate with a clean buff-wheel.—*Stomatologist.*

Spots in Pink Rubber Facing.—When the red or black rubber is forced through the pink and shows in front, the spots may be drilled out with an inverted cone bur and the cavities filled with pink gutta-percha. It will harmonize with the pink rubber and not be conspicuous in the mouth.—F. A. GRAHAM, *Dental Review.*

Repairing Punctures in Rubber Dam After Adjustment.—Take a piece of surgeons' adhesive plaster of the proper size, slightly warm it, and cover the puncture. It will effectually seal the opening. I got this idea from Dr. Pherrin of Central City, Iowa, and I believe it is original with him.—J. V. CONZETT, *Dental Review.*

Preparation for Treating Root-Canals.—A good preparation for treating putrescent root-canals and for soothing inflamed pulps is made by mixing equal parts of oil of cloves and carbolic acid crystals. This can easily be accomplished by melting the carbolic acid crystals by heat and adding the oil of cloves.—F. W. STEPHAN, *Dental Review.*

Ptyalism.—The *Medical Press* recommends the following:

℞—Tinct. myrrhæ,	ʒiij;	
Potass. chloratis,	ʒss;	
Sodii chloridi,	ʒij;	
Aquæ dest.,	q.s. ad ℥viij.	M.

Sig.—Use as a mouth-wash. Repeat every two hours.

Neuralgia.—*Revue Médico-pharmaceutique* recommends the following formula as valuable in neuralgia:

℞—Quin. valerianatis,	gr. jss;	
Extr. hyoscyami,	gr. $\frac{8}{10}$;	
Extr. cinchonæ,	gr. $\frac{3}{4}$.	M.

Fiat pil. no. j.

Sig.—Take two to four such pills daily.—*Monthly Cyclopedia of Pract. Medicine.*

To Cleanse Hypodermic Needles.—If neglected so that the wire cannot be passed, the point may be heated in an alcohol flame to burn out the organic matter. When the wire is rusted in the cannula the latter should be allowed to soak over night in neutral oil, and then heated as before. After that all traces of rust are removed by forcing into the point more oil.—*Medical Record.*

Inlay Margins.—Inlay margins should have as nearly a right-angle section as is possible to obtain with walls that are divergent, for strength, for structural perfection, and for color effect. Furthermore, it simplifies the manipulation in the construction of the inlay, and reduces the danger of fracturing the margins in forcing the inlay to place in setting it.—J. E. NYMAN, *Dental Summary.*

A Low-Fusing Alloy.—An alloy composed of five parts of bismuth, one and one-half parts of cadmium, and two parts of tin fuses at so low a temperature that it may be poured into a plaster impression as soon as the impression is removed from the mouth. It produces an accurate die which can be used in the hydro-swage, or with shot or corn-meal as a counter-die.—W. A. BUSCHO, *Dental Review.*

Removal of Vulcanite from Porcelain Teeth.—Cover the bottom of an iron ladle, such as used for melting lead or zinc, with a layer of dry plaster of Paris; lay the teeth to be cleaned on the surface and sprinkle dry plaster over, completely covering them; place over a big Bunsen flame in draught chamber or in coke furnace, and heat to redness. Then cool down gradually, when on removal the teeth should be found perfectly clean.—W. T. FINLAYSON, *Dental Record.*

To Keep the Gingival Margin Dry Without Rubber Dam.—Prepare the cavity and place a napkin in position. Saturate a little floss silk, or small, loosely twisted thread of absorbent cotton with thin cement. Dry the cavity, and pack the silk or cotton around under the gum margin. This method is often useful where the rubber and clamp are in position and the rubber is stretched so that it does not pass under the gum margin at the sides of the clamp.—R. E. SPARKS, *Dental Review.*

Roughen the Margins.—Some operators trim the cavo-surface angle with a gem stone and then finish it with sandpaper disks. Tight margins cannot under any circumstances be made against a smooth margin if gold is the filling material used. Gold slides over a polished surface, for there is nothing against which it can be restrained in its course. But roughen that margin by planing it with a sharp chisel, and gold will hug that roughened surface, if properly placed, so that watertight margins can be made.—E. K. Wedelstaedt, *International.*

The Relation of Dental Disease to Appendicitis.—No doubt the great prominence attaching to appendicitis in recent years is due largely to more frequent correct diagnosis and more frequent successful surgical interference than was the case fifteen or twenty years ago. At the same time it is at least open to argument that the frequency of the disease has increased *pari passu* with the greater prevalence of dental disease consequent on the harmful methods of feeding that obtain under the conditions of modern civilization. This remark applies, I think, with peculiar force to children and young adults.—Norman G. Bennett, *Brit. Dental Journal.*

Hypersensitive Dentin.—The long list of physical and pharmaceutical remedies recommended for dental hyperesthesia we all know frequently fail in acute cases. Refrigeration with ethyl chlorid is the most active remedy, but it has the great disadvantage of its volatility and the painfulness of its application, insupportable by some patients. Hot carbolic acid, recommended by Dr. Jenkins, although very efficacious in mild cases, is not sufficient in acute hyperesthesia. It is then that nervocidin will surprise us by its effects, for the application of this drug will, without destroying the vitality of the pulp, suppress in a few hours all sensitivity during the excavating.—F. Aguilar, *Pacific Dental Gazette.*

Aluminum.—Aluminum is in many ways a wonderful substance, albeit in the natural world most of it is oxidized and turned to clay. Its avidity for oxygen is one of its most salient characteristics. It is said that we never see the metal, directly, in air, but always, and only, through a veil of superficial oxid, which forms on its free surface with marvelous rapidity. It is stated that if a fresh surface of aluminum be prepared by scraping with a knife, the oxygen of the air runs in as fast as the scale is peeled off, and keeps close behind the knife blade. If it were not for this superficial scale of oxid, which acts as a barrier to further action, the metal would burn up in the air. The large amount of heat developed by thermit, a mixture of powdered aluminum with oxygen-giving substances, bears witness to the activity of the oxidizing process when completed.—*Electrical World and Engineer.*

Burning from X Rays.—Mr. H. Lyle, Senior Surgeon to the Liverpool Hospital for Cancer and Skin Diseases, in a letter to the *Lancet*, May 28, 1904, states that burns caused by the X rays, which are generally found to be so intractable, are readily cured by the following ointment, the dermatitis soon disappearing:

R—Plumb. oxid.,	ʒj;
Zinc. carb.,	ʒij;
Glycerin.,	ʒj;
Ol. oliv.,	ʒss;
Adeps benzoat.,	ad ℥j.

M. ft. ung.

Sig.—To be applied freely.

—*Mo. Cyclopedia of Pract. Medicine.*

Ancient Medical Literature.—The oldest medical works in existence are those of the Chinese, and date back to nearly 3000 years B.C. Then, as now, they divided their subjects under the captions of healing, cooling, refreshing, and temperate. They have everything divided into classes, and their prescriptions are classified under seven headings, as follows: (1) The great prescription. (2) The little prescription. (3) The slow prescription. (4) The quick prescription. (5) The odd prescription. (6) The even prescription. (7) The double prescription. These are applied under four special circumstances and conditions, which in their turn are classified. Fire is an agent in which they have great faith, as also they have in mineral waters.—*Medical Times.*

Historical Item on the Porcelain Filling.—The first record of porcelain fillings, so far as we now know, is found in a little work by Mr. J. L. Murphy, published in London in 1837. He states he had been using them about two years with much satisfaction for fillings in conspicuous positions. He used glass, or a low-fusing porcelain. His suggestion was by no means lost. Others took it up and struggled on, trying by this method and by that to overcome the many difficulties attending its use. The plastic cements, the cultivation of manual dexterity among dental operators, better methods, materials, and appliances—not the work of one man, but of many—covering a period of nearly seventy years, has made

possible the beautiful porcelain fillings, and the many ready methods of producing them. —William H Trueman, *Items of Interest.*

A New Property of Aluminum.—"A German investigator," says the *Scientific American*, "has discovered an exceedingly valuable and important property of aluminum, which consists in its application as a whetting agent, the effect produced on cutlery set with it being most astonishing Though a metal, aluminum possesses the structure of a fine stone, has a strong dissolving power, and develops, upon use for honing, an exceedingly fine metal-setting substance of greasy feel, while showing great adhesion to steel. The knives, etc., treated with it quickly obtain such a fine, razor-like edge that even the best whetstone cannot produce a like result. Thus, knives which had been carefully set on a whetstone, when magnified a thousand times still exhibited irregularities and roughness on the edge, while the edge of knives sharpened on aluminum, upon exactly the same magnification appeared as a straight, smooth line."—*Medical Times.*

Therapeutics of Gout.—Robin (*Bull. Générale de Therapeutique*, No. 16, 1904) discusses three types: (1) The acute attack of gout; (2) subacute gout; (3) chronic gout. Colchicum and its active principles are the chief drugs. Granules of colchicin, 0.001 gm.—four granules at the onset, or during twenty-four hours. The tincture of the seed or root is effective, but variable in strength. To obtain results, 40 to 60 drops a day in doses of 10 to 15 drops at a time is necessary, if a visceral manifestation preceded the articular attack or renal symptoms. The action of colchicum can be aided by local applications and hot air or steam. Sodium salicylate is useful in subacute gout. In chronic gout, hygiene, regulation of life, and drugs are all equally important. In diet, red meats should be excluded. But two-thirds of the diet should be made up from white meats. Of drugs, strychnin and arsenic are valuable.—*Monthly Cyclopedia of Pract. Medicine.*

Preparing and Filling Cavities in Porcelain Teeth.—It takes but a few minutes to prepare a cavity. Much better results can be obtained by the use of a thin diamond disk than with the diamond point drill. By using the disk, cavities may be made in almost any part of the tooth in which the natural ones usually decay.

First cut away with a corundum or carborundum stone the surface of the tooth where the filling is to be placed, and then with the diamond disk the sides of the cavity can be easily undercut sufficiently to hold the filling. Moss fiber or some form of sponge gold is much easier started than foil, and can be worked with very little malleting. It only requires about half the quantity of gold necessary to fill the ones prepared with the drill. Approximal cavities can easily be imitated by this method, which would be impossible in the old way; corners can be built out and a filling can be inserted in almost any position desired.

With a little experimenting one will be surprised at the artistic results which may be obtained, and I am sure your patients will fully appreciate your efforts in this direction. —D. Linley Palmer, *Dental Brief.*

Zinc Oxyphosphate as a Cavity Lining.—Believing cement to be the material most compatible with tooth-structure, and also the material most easily manipulated in this relation, has led me to use it almost universally as a lining in cavities to be filled with either gold or alloy. I am convinced that the right quantity mixed to a proper consistence, placed beneath gold foil in the cavity and subjected to a pressure required to weld the gold, will perfectly seal the dental tubuli. Like results are just as easily and positively reached when used under an alloy, by carefully and thoroughly burnishing a small quantity of the filling material over the entire dentinal surface of the previously cement-lined cavity. It has been claimed by some operators that cement prevents amalgam from shrinking away from the cavity wall. This may be true, but I think it very hard to verify, and believe that the better appearance of such fillings in the mouth of the patient is due to the cement sealing of the dental tubuli beneath the amalgam rather than to non-shrinkage. However, it is true that the dark lines that so generally mark the outline of amalgam fillings are not present where the dentinal surfaces have been covered with a layer of cement.—F. S. Trickey, *Dental Review.*

Filling Root-Canals with Zinc-Oxyphosphate Cement and Gutta-Percha or Swiss Broach Points.—In filling a root, use cement of very thin consistence, but thoroughly mixed with a large drop of oil of cinnamon first incorporated with the acid before the addition of powder; now use a small, smooth steel broach, thoroughly pump the cement to the end of the root, and then insert a gutta-percha root-canal point, and push it to the end; heat a ball-shaped instrument

and cut off the surplus length of the gutta-percha point; add some powder to the remaining cement, or mix more quite stiff and fill part or more of the crown, as desired, and as this keeps the thin cement in root forced to place, do not fail to fill at least the bulbous portion of tooth. Occasionally, we find roots of molars, the canals of which are too small for the ready introduction of gutta-percha points; in those cases I use a small Swiss, untempered broach, in place of the gutta-percha point, first introducing the broach to the end of the root, to ascertain the length; it is then withdrawn; cut off with crown shears, and then with heavy foil carriers or a blunt instrument it is returned to the root, occupying within the cement the place of the gutta-percha point.—E. H. GINNELLEY, *Items of Interest.*

A Dental Fad of the Past Century.—During the early part of the past century there existed a condition of practice so widely employed, so clamored for by the laity, that it may be included among the fads of the profession. I refer to the injurious practice then in vogue of attempting to make the teeth white. This was not only practiced extensively by the dentist who recognized that it was what the public wanted, and therefore an opportunity to gain favor, but it was in turn sought after and in fact demanded by the public because they believed it to be a logical practice, accompanied by little or no evil results. This was an injurious custom with fortunately a short life, and one for which both the patient and operator were responsible. On the part of the dentist the practice for a time prospered, principally because he lacked the moral force to bring about its condemnation. It likewise flourished because the patient, ignorant of the mischief which followed, was inclined to be dissatisfied with and even questioned the ability of the practitioner who neglected or refused to perform it. The operation, which consisted in applying some one of the mineral acids to the surface of the enamel, while condemned by a few, was sanctioned by many, the argument being that "the professional man must please his patient at all risks."—I. NORMAN BROOMELL, *Dental Summary.*

Filling Labial Cavities in Upper Incisors with Gold.—Prepare the cavity without adjusting dam or ligature, employing a stream of water or blast of air for removing the chips. Avoid laceration of gum, even when it overhangs cavity margin. Stop the oozing of blood or serum by means of a stream of very warm water followed by an application of adrenalin chlorid. Place an absorbent cotton roll under the upper lip, and the edge of a napkin under the teeth. Dry the cavity and surroundings with warm air, and fill the greater part of the cavity with gold slightly annealed. Large pellets may be used at the cervical margin to prevent moisture from gaining the cavity. Use hand pressure and finish the surface not covered by gum with annealed gold. Burnish the filling well and it will be found that the unannealed gold under the gum, though dense, will finish easily. These fillings, being exposed neither to strain nor pressure, do not require much cohesion of the gold. Even a little moisture on the first pellets will not seriously damage the filling if the cavity be properly prepared. By this method unnecessary cruelty to the patient during the operation and injury to gum festoons by the clamp or ligature is avoided, also a clearer field and economy of time is secured for the operator. Except where clearly indicated avoid separators, clamps, ligatures, and rubber dam in any operation.—W. C. GOWAN, *Dental Review.*

The Need of Physical Exercise.—Erasistratus, one of the most famous physicians and anatomists of antiquity, believed and taught that exercise "is not particularly indicated for the preservation of the health." Since his time many wise and thoughtful persons have held the same opinion, which, indeed, is now regarded as correct by the best authorities. This does not mean that a person of plethoric habit can gratify his eating and drinking propensities to the full and yet remain healthy though avoiding every bodily exertion not absolutely necessary. It merely implies that exercise, in and by itself, is not a salutary practice. nor one to be relied upon for warding off the consequences of over-indulgence. As an eminent physiologist and hygienist expresses it: "If a man persistently overfills his blood and connective tissue with materials ingested greatly in excess of his requirements, exercise, especially if spasmodic and violent, and taken at irregular intervals, is likely to do him more harm than good." Even among people of temperate habits the mistake is frequently made of seizing opportunities of leisure from monotonous work to do a sudden spurt of other and unaccustomed work, under the false impression that it will do them good. The chances are that they need rest a great deal more than they need exercise. To people who live in cities the drain of normal life upon the physical and mental energies is all they are usually able to resist. Exercise for its own sake should

not be taken when it induces fatigue. It should not ordinarily be prolonged after it has started sensible perspiration, unless one is prepared for a bath and a change of underclothing at its termination. With moderation in eating and drinking, and zeal in the performance of the duties of life, moderation in exercise will commend itself to the sane man as much better than over-exertion.—*New York Medical Times.*

Suprarenin.—Mueller (*Münchener medicinische Wochenschrift*, Bd. li, Heft 5 u. 6) presents the following report of his experience with suprarenin as a hemostatic in 74 operations on dogs: (1) Suprarenin has a very marked constricting action on bloodvessels. (2) It produces instantaneous ischemia when employed in a solution of 1: 1000 or 1: 2000. To produce local anemia of parenchymatous tissues, solutions of the strength named must be employed; if the skin or fatty and muscular tissues are to be made anemic a solution of 1: 5000 to 1: 10,000 is sufficient. Anemia is complete within two minutes. (3) Ten cubic centimeters of a solution 1: 1000 may be injected in an adult without fear of toxic symptoms. (4) In the concentrations mentioned, suprarenin has no deleterious effect on the living cell. (5) The solution may be sterilized by boiling. (6) In solutions weaker than 1: 2000 it is unstable; rose-colored solutions are as active as colorless solutions; turbidity or dark discoloration indicates decomposition, and the solution should not be used. Dilute solutions should always be freshly prepared. (7) When used in a solution of 1: 10,000 to 1: 20,000 suprarenin possesses a marked stimulating action on the heart. As much as one cubic centimeter of the solution may be injected into the myocardium without injury to the animal. (8) Its hemostatic action commends it for use in individuals afflicted with heart disease, anemia, or cachexia. (9) Since it prevents parenchymatous hemorrhage, it is especially valuable in operations on the liver or kidney. (10) To obtain prompt action, it should be injected directly into the tissues. (11) In all tissues it produces an absolute closure of the capillaries, small arteries, and veins, and constricts the larger bloodvessels. (12) Its action is shown by the appearance of yellow discoloration. (13) The effect is durable, sometimes persisting for several hours. (14) Secondary hemorrhage after the use of suprarenin has never been observed, and is not to be feared. (15) The drug is readily soluble in water, therefore its dose can be carefully calculated. It acts best when dissolved in normal salt solution. (16) The injections are painless, and may be advantageously used in conjunction with local anesthesia. (17) The best instrument for the injection is a five-cubic centimeter syringe fitted with a long, thin needle. For injections into the liver a blunt needle with a lateral opening is best.

Most of the author's experimental operations were absolutely bloodless, a small number being accomplished with slight bleeding.—*Therapeutic Gazette.*

The Shadow Problem in Reference to Porcelain Inlays.—The variation in color that so often comes when a porcelain filling is cemented into place arises from two prime causes: First, the shadow due to an exclusion of light by an opaque cement wall; second, the reflection of color of the cement itself into the substance of the inlay. It has been claimed by Dr. Reeves and others that they can overcome these two difficulties by constructing the inlay in layers of different colors that so blend as to form the shade desired. How these various colors in a porcelain sufficiently translucent to permit them to blend can be free from the darkening that comes when a large portion of the porcelain is excluded from the light by an opaque cement, passes comprehension. We know that the shadow in the porcelain is ordinarily in exact ratio as the position of the filling permits the zinc oxyphosphate to shut it off from the light, the shadow from the darkened part penetrating through the entire porcelain inlay; therefore, if as has just been said, the inlay is sufficiently translucent to permit the color layers to blend into one color, why should not this same translucency permit the shadow cast by the cement to further modify the color? It has been claimed that two layers of different colors will so break up the light as to render the porcelain impervious to the shadow from the side or underneath; but this does not seem to be the case with backed facings. We know that if a facing is backed with platinum it will assume a darker, bluer appearance; and if it is backed with pure gold it will have a darker shade with a tendency to be a little more yellow, and yet the facing is made of two different layers of color. If this is so with the tooth, it is difficult to understand why the same law should not hold with the inlay—why the different colored layers in the tooth should permit the shadow to darken them, and the different colored inlay should be unaffected; but even if the advocates of this layer method of overcoming shadows are accurate in their contention, this method can only apply to fillings

of fairly large size, as the smaller inlays are too minute to be successfully divided up into layers. In fact, such a process reminds us of a plan devised by the late Dr. Atkinson for saving a pulp by excising the dead portion and uniting the flaps of the healthy part with a stitch, so that union by first intention might be obtained. Still, let us wish the layer advocate good luck. By a variety of methods the best ultimate method is obtained. Let those who get satisfactory results by making inlays in layers continue and perfect the process; but for those who do not find the layer method satisfactory as a means of overcoming the shadow, there is still the older plan of lightening the porcelain so judiciously as to counterbalance the shadow, and coloring the cement with pigment, so as to make it at least approximate the color of the tooth. If these two means are used with judgment, and the inlay is not over-baked in the slightest degree, there should be little trouble in getting a good match.

Of course, it takes some experience to tell just how much lighter the porcelain should be made; but practice will overcome this difficulty, and matches can be readily obtained so accurate that only by special observation can the difference in color be observed.—Joseph Head, *Items of Interest.*

OBITUARY.

NORMAN SCOTT TOWNER.

Died, at Atlantic City, N. J., February 6, 1905, of apoplexy, Norman Scott Towner, in his fifty-ninth year.

Mr. Towner was born in Wilmington, Del., January 27, 1847. After his father's death, his mother, having decided to change her residence, moved to Brooklyn, N. Y., with her son, then a boy of four. Here they resided for several years, whence they removed to New York city, where the subject of this sketch lived uninterruptedly up to the time of his death.

Young Towner attended the public schools, and being an assiduous and diligent boy soon acquired the fundamentals of a general education. He commenced his long business career while yet a boy of sixteen, entering at that age the service of the late Dr. Samuel S. White, in the autumn of 1862.

That he was endowed with the qualities which in a boy augur success is fully evidenced by his gradual rise to the position which he was so ably filling at the time of his death. The history of his career is but the parallel to that of so many men who, having started in the humblest of positions, have striven persistently, disregarding temporary failures and setbacks, and have reached eventually the goal of at least relative success. Advancing from the post of errand boy to the positions of clerk and commercial traveler, he was, upon the establishment of the New York Uptown Branch of The S. S. White Dental Manufacturing Company, made its manager.

The advance made by dentistry during the past fifty years, in all its branches, has necessitated the introduction of changes in the nature of the instruments and materials to be employed, and to all of this Mr. Towner was by no means an inactive witness. His sphere of influence was not limited to that of a mere salesman; he helped the busy practitioner to familiarize himself with the new and not infrequently most intricate devices now included in the domain of operative instrumentation, thereby helping him to successfully overcome obstacles the nature of which can hardly be appreciated at the present time with the complete armamentarium at our command.

A man of sound principles, loyal to his trust, faithful to his friends, slightly reserved by nature, yet social and genial, he was held in high esteem by his business associates and by all those who knew him sufficiently to appreciate the qualities which made of him the man he was—good, kind, and broad-hearted.

He never married, and so far as is known is survived by neither immediate nor distant relatives.

SOCIETY NOTES AND ANNOUNCEMENTS.

"LEWIS AND CLARK" DENTAL CONGRESS.

NOTICE FROM CLINIC COMMITTEE.

THE Lewis and Clark Dental Congress to be held in Portland, Oregon, July 17, 18, 19, and 20, 1905, promises to be the largest ever held on the Pacific Coast.

The Committee on Clinics asks for voluntary clinics or table demonstrations from members of the profession, and suggests that notice of the same be sent the committee as soon as possible. In order that the program be complete, names of clinicians and clinics must reach the chairman not later than June 15th.

G. H. NOTTAGE, *Chairman Com. on Clinics*, Oregonian Bldg., Portland, Oregon.
J. M. MEYER, Tacoma, Wash.
F. I. SHAW, Seattle, Wash.
A. STARK OLIVER, Spokane, Wash.
C. E. POST, San Francisco, Cal.
CLAUD W. GATES, Salt Lake City, Utah.
A. W. CATE, Boise, Idaho.
W. H. BARTH, Great Falls, Montana.
J. H. HOLMES, New Westminster, B. C.

[See page 393 of this issue for editorial reference and full information respecting the Lewis and Clark Dental Congress.]

UNIVERSITY OF CALIFORNIA

ALUMNI ASSOCIATION—DENTAL DEPARTMENT.

THE annual meeting and clinics of the Alumni Association of the Dental Department of the University of California will be held at the college infirmary, corner of Taylor and Market streets, San Francisco, May 16 and 17, 1905.

Assurance of a large number of clinics will guarantee a successful meeting.

All reputable legal practitioners are cordially invited to be present.

PERCY D. GASKILL, *Sec'y*,
San Francisco, Cal.

CALIFORNIA STATE DENTAL ASSOCIATION.

AT a meeting of the Board of Trustees of the California State Dental Association, held in San Francisco February 10, 1905, it was unanimously decided to adjourn the state meeting for 1905 in favor of the Lewis and Clark Dental Congress, to be held in Portland, Ore., July 17, 18, 19, 20, 1905.

JOSEPH LORAN PEASE, *Cor. Sec'y*,
Central Bank Building, Oakland, Cal.

VERMONT STATE DENTAL SOCIETY.

THE twenty-ninth annual meeting of the Vermont State Dental Society will be held at Hotel Berwick, Rutland, March 15-17, 1905.

THOMAS MOUND, *Sec'y*,
Rutland, Vt.

SEVENTH DISTRICT (N.Y.) DENTAL SOCIETY.

THE annual meeting of the Seventh District Dental Society of the State of New York will be held in the Chamber of Commerce rooms, Rochester, N. Y., March 28 and 29, 1905.

I. C. EDINGTON, *Ch'man Business Com.*,
Rochester, N. Y.

NEW YORK COLLEGE OF DENTISTRY.

REUNION—CLASS OF '94.

THE Class of 1894 of the New York College of Dentistry will meet at the Arena Restaurant, New York city, on the evening of March 13, 1905, to celebrate the eleventh anniversary of its graduation. All members are invited to participate.

JAMES MCKENZIE, *Sec'y*,
New York, N. Y.

AMERICAN DENTAL SOCIETY OF EUROPE.

THE next annual meeting of the American Dental Society of Europe will take place at Geneva, Switzerland, April 21 to 24, 1905. A cordial invitation is extended to members of the profession.

CHAS. J. MONK, *Hon. Sec'y.*

CENTRAL MICHIGAN DENTAL SOCIETY.

THE next annual meeting of the Central Michigan Dental Society will be held at Lansing, Mich., March 28 and 29, 1905.

You are cordially invited to attend. We anticipate a pleasant and profitable meeting.

S. A. HORNING, *Sec'y and Treas.*,
Portland, Mich.

MISSISSIPPI DENTAL ASSOCIATION.

THE next meeting of the Mississippi Dental Association will be held in Jackson, Miss., April 18, 19, and 20, 1905. We expect to have a banner meeting, and an attractive and instructive program. Every dentist in the state is most earnestly requested to attend and lend a helping hand.

E. N. BIGHAM, *Sec'y*,
Pontotoc, Miss.

CONNECTICUT STATE DENTAL ASSOCIATION.

THE forty-first annual convention will be held in the Y. M. C. A. building, New Haven, Conn., Tuesday and Wednesday, April 18 and 19, 1905. The members of the New Jersey State Dental Association and the First District Dental Society of New York city are invited to attend.

The program will be as follows: Dr. Sol. Freeman, New York city, "The Use of Compressed Air in Operative Dentistry." Dr. Joseph Head, Philadelphia, "The Best Method of Inserting Adhesive Gold and Amalgam Fillings." Dr. C. N. Johnson, Chicago, "Difference in the Preparation of Cavities for Fillings and Inlays." Dr. M. L. Rhein, New York, "The Technique of Pulp-Removal and Root-Treatment Associated Therewith." Dr. L. Ashley Faught, Philadelphia (subject to be announced). Dr. J. Tenney Barker, Wallingford, Conn., Recorder State Board of Dental Examiners, "Dental Legislation."

F. HINDSLEY, *Sec'y*,
Bridgeport, Conn.

FIFTH DISTRICT (N. Y.) DENTAL SOCIETY.

THE thirty-seventh annual meeting of the Fifth District Dental Society of the State of New York will be held at the Yates Hotel, Syracuse, on Tuesday and Wednesday, April 11 and 12, 1905. First session begins promptly at 2 o'clock on Tuesday.

An excellent program has been prepared.

Dr. Wm. Jarvie, president of the New York State Society, will be present.

E. A. SMITH, *Sec'y*,
Rome, N. Y.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

THE next meeting of the Dental Society of the State of New York will be held at Albany, N. Y., May 12 and 13, 1905. We expect a large attendance.

Papers will be read by Dr. E. T. Darby, Philadelphia; Drs. S. G. Perry and R. Ottolengui, New York; Drs. J. P. Buckley, W. T. Reeves, and A. H. Peck, Chicago.

The clinic committee, of which Dr. F. W. Proseus is chairman, are hard at work arranging an interesting program.

W. C. DEANE, *Sec'y*,
New York, N. Y.

KENTUCKY STATE DENTAL ASSOCIATION.

THE next annual meeting of the Kentucky State Dental Association will convene at Lexington, Ky., May 15 and 16, 1905.

We anticipate a most pleasant as well as profitable meeting, and a cordial invitation is extended to the profession.

W. M. RANDALL, *Sec'y*,
Masonic Bldg., Louisville, Ky.

TEXAS STATE DENTAL ASSOCIATION.

The Texas State Dental Association will meet at Austin, Texas, May 18, 19, and 20, 1905. All ethical members of the profession are invited to meet with us.

Bush Jones, *Sec'y*,
Dallas, Texas.

KANSAS STATE DENTAL ASSOCIATION.

The thirty-fourth annual session of the Kansas State Dental Association will be held in Topeka, May 17, 18, and 19, 1905. Special attention is being given to the clinical program.

A cordial invitation to be present is extended to the profession. Headquarters at Copeland Hotel.

F. O. Hetrick, *Sec'y*,
Ottawa, Kansas.

SOUTHERN WISCONSIN DENTAL ASSOCIATION.

The eleventh annual meeting of the Southern Wisconsin Dental Association will be held at Racine, Wis., May 30 and 31, 1905.

The profession are cordially invited to attend.

C. W. Collver, *Sec'y*,
Clinton, Wis.

NEBRASKA STATE DENTAL SOCIETY.

The twenty-ninth annual meeting of the Nebraska State Dental Society will be held at the Lincoln Dental College, Lincoln, Neb., May 16, 17, and 18, 1905.

The clinic committee promises us the best meeting in the history of the society. All reputable members of the profession are invited to attend.

M. E. Vance, *Sec'y*,
Lincoln, Neb.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The annual meeting of the National Association of Dental Faculties will be held in Buffalo, N. Y., commencing at 2 P.M. Thursday, July 27, 1905. The Executive Commitee will meet at 10 A.M. on the same day.

Special business to come before the N. A. D. F. is the consideration of the proposed revision of the constitution and by-laws.

H. B. Tileston, *Chairman Ex. Com.*,
John I. Hart, *Sec'y Ex. Com.*,
New York, N. Y.

GEORGIA STATE DENTAL SOCIETY.

The next meeting of the Georgia State Dental Society will be held in Atlanta, Ga., May 4, 5, and 6, 1905.

D. H. McNeill, *Cor. Sec'y*,
Athens, Ga.

NEW YORK INSTITUTE OF DENTAL TECHNIQUE.

At the annual meeting of the New York Institute of Dental Technique, held at the Hotel Chelsea January 24, 1905, the following officers were elected for the ensuing year: Frederick Crosby Brush, president; Charles M. Hoblitzell, vice-president; E. Darwin Reed, secretary and treasurer. Executive Committee—James F. Hasbrouck, chairman, Edwin W. Harlan, L. Reigh Divine.

Dr. Edwin W. Harlan read an interesting paper, and demonstrated his method of making a perfect-fitting Richmond band. Dr. J. H. Tuttle demonstrated his method of making a perfect-fitting Davis crown by use of the Jenkins body.

E. Darwin Reed, *Sec'y*,
874 Broadway, New York city.

NATIONAL DENTAL ASSOCIATION.

Coming Meeting—Section III.

In preparation for the meeting of the National Dental Association at Buffalo, N. Y.,

July 25 to 28, 1905, original papers and investigations are asked to be submitted upon the following topics: Oral surgery, anatomy, physiology, histology, pathology, etiology, hygiene, prophylaxis, materia medica, and allied subjects.

J. D. PATTERSON, *Ch'man Sect. III.*,
Kansas City, Mo.

MINNESOTA STATE DENTAL ASSOCIATION.

THE twenty-second annual meeting of the Minnesota State Dental Association will be held in Minneapolis, Minn., on June 1, 2, and 3, 1905.

GEO. S. TODD, *Sec'y*,
Lake City, Minn.

MASSACHUSETTS BOARD OF REGISTRATION IN DENTISTRY.

A MEETING of the Massachusetts Board of Registration in Dentistry for the examination of candidates will be held in Boston, Mass., March 8, 9, and 10, 1905.

All applications, together with the fee of twenty dollars, must be filed with the secretary of the Board on or before March 1st, as no application for this meeting will be received after that date. (Hereafter candidates for second and subsequent examinations will be required to fill out an application blank and forward it to the secretary as above.)

G. E. MITCHELL, *Sec'y*,
Haverhill, Mass.

TEXAS BOARD OF DENTAL EXAMINERS.

THE Texas State Board of Dental Examiners will meet in Austin, Texas, May 15, 1905, for the purpose of examining all applicants. Examinations will be both theoretical and practical. Applicants must furnish their instruments, materials, and patients for any demonstration called for by the Board.

M. S. MERCHANT, *Pres.*, Giddings, Texas.
C. C. WEAVER, *Sec'y*, Hillsboro, Texas.

DENTAL COMMISSIONERS OF CONNECTICUT.

THE Dental Commissioners of Connecticut hereby give notice that they will meet at Hartford May 27, 1905, as prescribed by law, and will adjourn to June for the summer examinations, so as to give students who do not finish their college or other educational course until June an opportunity to secure a license to practice without the long delay now made necessary by being required to wait until the following year.

By direction of the Dental Commissioners.

J. TENNEY BARKER, *Recorder*,
Wallingford, Conn.

PENNSYLVANIA BOARD OF DENTAL EXAMINERS.

THE Board of Dental Examiners of Pennsylvania will conduct examinations simultaneously in Philadelphia and Pittsburg, June 6 to 9, 1905.

For papers or further information applicants must address

Dr. N. C. SCHAFFER, *Sec'y Dental Council*,
Harrisburg, Pa.

SOUTH DAKOTA BOARD OF DENTAL EXAMINERS.

THE next meeting of the South Dakota State Board of Dental Examiners will be held at Mitchell, S. D., July 11, 1905, beginning at 1.30 P.M.

All candidates will be required to perform practical work in both operative and prosthetic dentistry, and should bring all instruments and materials necessary. Vulcanizer, lathe, and swaging appliances will be furnished by the Board. Application, together with fee of ten dollars, must positively be in the hands of the secretary before July 7th.

G. W. COLLINS, *Sec'y*, Vermillion, S. D.

WEST VIRGINIA BOARD OF DENTAL EXAMINERS.

THE West Virginia State Board of Dental Examiners will hold its annual meeting for examinations in Morgantown, W. Va., June 7, 8, and 9, 1905.

Applications should be filed with the secre-

tary before June 1st. Application blanks and all necessary information will be furnished by the secretary.

H. M. VAN VOORHIS, *Sec'y*,
Morgantown, W. Va.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

THE annual meeting of the National Association of Dental Examiners will be held at Buffalo, N. Y., commencing 10 A.M., July 24, 1905, and continuing until adjournment.

The hotel and assembly rooms for holding sessions will be announced later. Arrangements for members in the East have already been made with the Lackawanna Railroad, for reduced rates on the fast "de luxe" trains, leaving New York 10 A.M., 6.10 P.M., 8.45 P.M., and 2 A.M.

CHAS. A. MEEKER, *Sec'y*,
29 Fulton st., Newark, N. J.

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JANUARY 1905.

January 3.

No. 778,955, to RICHARD M. DUNLEVY. Dental tool-holder.

No. 778,981, to ALFRED LITTAUER. Dental mouth-mirror.

January 10.

No. 779,496, to ROBERT E. PAYNE. Artificial tooth.

January 17.

No. 780,146, to AMOS A. WILCOX and MARCELLIUS JEWETT. Dental instrument.

No. 780,147, to AMOS A. WILCOX and MARCELLIUS JEWETT. Dental instrument.

No. 780,322, to MONROE N. CALLENDER. Electric dental instrument.

January 24.

No. 780,589, to ALEXANDER W. WIMMER. Dental automatic plugger.

No. 780,919, to NED SHOCKLEY. Dentometer.

January 31.

No. 781,168, to JAMES B. WELLS. Means for attaching artificial teeth to plates.

No. 781,277, to CHAS. W. FAHEY. Tooth-crown holder.

No. 781,283, to FRANK A. HIGGINS. Hypodermic power-syringe.

No. 781,292, to JAMES M. MURPHREE. Mouth-brush.

No. 781,313, to JACOB A. THOMAS. Dental disk package.

No. 781,405, to MARCUS A. COYKENDALL. Blank for dental plates.

No. 781,420, to JOHN R. HALDEMAN. Artificial tooth.

No. 781,587, to JOSEPH E. BLAKE. Rubber disk for dental use.

No. 781,589, to CYRUS L. BUSKWALTER and WILLIAM G. WIRT. Dental plate.

No. 781,617, to OTTO B. PRICE. Dental disk carrier.

THE

DENTAL COSMOS.

VOL. XLVII. APRIL 1905. No. 4.

ORIGINAL COMMUNICATIONS.

THE ADVISABILITY OF EXTRACTING TEETH IN THE CORRECTION OF IRREGULARITIES.

By CALVIN S. CASE, M.D., D.D.S., Chicago, Ill.

AT the February 1905 meeting of the Second District Dental Society of New York, a number of prominent orthodontists were invited to present papers upon the given subject: "The Advisability of Extracting Teeth from Crowded Arches." I have therefore decided to add to this symposium in dental literature a brief contemporaneous article for the COSMOS, expressive of my views upon the important subject of extraction in the practice of orthodontia, which today is being so freely discussed. I wish to be placed on record at this time in the columns of the COSMOS as asserting that which I have elsewhere expressed in numerous papers, viz: It is never advisable to extract teeth because of the single reason that they are "crowded" in the arch, or even quite irregular in their occlusion and arch alignment; for the following reasons:

First. With all the ordinary crowded malpositions it is always possible to place all of the teeth in proper arch alignment and pose; therefore that phase of the subject, that they are *crowded* and irregular, should never enter into the question.

Second. In a very large proportion of all cases where teeth are "crowded" and irregular, when properly corrected they will be found to be in normal dental and facial relations, which would be impossible were teeth extracted.

Third. In many instances where teeth are crowded and irregular, if they are corrected in their arch alignment and immediate relative pose, they will even be found to be *retruded* in relation to their dento-facial harmony. In other instances, where the teeth of *both* arches are crowded and irregular, if a "normal occlusion" be attained as well as an arch alignment, the entire dento-facial outlines will be found to be retruded; therefore, to extract teeth under these conditions because the dental arch or arches are "crowded," etc., could only tend to increase the principal difficulty.

Fourth, and finally. In no cases of crowded and irregular teeth should teeth be extracted unless it is plainly to be seen that after proper correction and growth-development the final result will inevitably leave them in a position which

produces a *protrusion* of the dento-facial outlines.

Following in the line of my second objection: In that very large class of irregularities which are characterized by mal-eruption and crowded mal-alignment of the upper canines, and which are nearly always caused by a premature loss of the deciduous canines, etc., permitting the adjoining teeth to partially or completely close the required spaces, the malpractice of extracting the first or second bicuspids is perhaps more common than in the correction of all other irregularities, whereas in about nine cases out of ten, if the buccal and incisor teeth were forced to the positions which nature intended they should occupy, normal occlusion and dento-facial harmony would be attained.

In about one-tenth of the malpositions of this character the upper buccal teeth will be found in perfect mesial mal-interdigitation, or fully the width of a bicuspid in front of a typical occlusion. If this is principally due to an inherited protrusion of the upper teeth and jaw, which would obtain were the canines in alignment; or if, after the full eruption of the second molars, it is even believed to be fully due to local causes, and in either case the lower teeth are not retruded in their dento-facial relations, extraction of bicuspids would be indicated, because a correction of the real irregularity without extraction would mean that all the upper buccal teeth would need to be moved distally equal to the full width of a bicuspid—which could not be accomplished without the strong probability that the resultant distal inclination would destroy perfect occlusion, to say nothing of the possible impaction of the third molars, and increased tendencies to destroy retention.

According to the teachings of the so-called "new school" of orthodontia, the upper buccal teeth—in conditions which I have outlined above, and in all conditions of protrusion to that extent—do not require to be moved distally more than half the width of a bicuspid, because the lower teeth can be moved mesially the balance of the distance for the securing of normal occlusion, with the reciprocal action of the intermaxillary force;—which is granted so far as the attainment of normal occlusion is concerned, but with the *inevitable result* that the upper protrusion is only one-half corrected in relation to dento-facial harmony, while the lower teeth, which were originally in normal dento-facial relations, are protruded to an equal extent, thus leaving the patient with a partial protrusion of both the upper and lower teeth.

In many cases where the above malocclusion obtains—*i.e.* mesio-distal mal-interdigitation of buccal cusps—one set is protruded and the other is retruded. If the protruded set be the upper, and it is not protruded more than to the extent of one-half the width of a bicuspid, a reciprocal disto-mesial movement of the upper and lower buccal teeth, followed by a reciprocal movement of the labial teeth, will, if properly performed, result in the attainment of normal occlusion and perfection of facial outlines. But a distal movement of all the upper buccal teeth even to the extent of one-half the width of a bicuspid is a very questionable undertaking; while with the lower it should not be entertained. Moreover, it should not be undertaken with patients older than twelve or thirteen, under the most favorable physical conditions, and then with watchful care and skilled consideration and manipulation of the movements attained. First: That the reciprocal action of the intermaxillary force is not protruding the lower teeth twice as much as it is retruding the upper—as it would be very liable to do if not properly controlled, which I have elsewhere pointed out. In other words, that the upper teeth are being retruded to the full extent sufficient to correct the upper protrusion, and not to an insufficient degree so as to leave the patient with more or less of a protrusion of the upper and lower. Second: That the distal movement of the upper buccal teeth to the required extent is not producing so much of an inclination of the masticating surfaces of the molars as to destroy perfect occlusion

and the probability of permanent retention. Third: That a distal movement to this extent will not be liable to produce a dangerous impaction of the third molars. Even if this is not liable, one would need to keep in touch with these cases and extract the third molars at the first opportunity, else permanent retention of the artificially posed teeth would be destroyed.

But why enter such a field of doubt, of danger, and of possible failure, merely to satisfy a sentiment that God does not make the mistake of placing in the mouth of the human individual more teeth than is necessary for perfect harmony in all physical and esthetic relations? Why ignore the possibility and the frequent undoubted fact that inherited inharmonies in contiguous structures over which we have no control make it impossible for us to place all of the teeth in the arch without fulfilling the designs of an inherited deformity? In my humble estimation it should be the highest aim of the orthodontist to remove without hesitation such portions of those naturally produced anatomical inharmonies as are within his reach, and which characterize the principal deformity, instead of attempting to carry out in so limited a degree the original designs of the Maker when he fashioned an Apollo.

Why consider for a moment that heroic and questionable teaching which demands for the perfect correction of dento-facial harmony a distal movement of all the buccal teeth of either jaw, even after the eruption of the second molars, to the extent of even *one-half* the width of a bicuspid, with its very objectionable possibilities, when it is a well-known fact that the *mesial* movement of the buccal teeth can be safely and more easily and perfectly accomplished, and in the above cases can be made to result in an equally perfect masticating occlusion?

Therefore in nearly all cases of mesio-distal mal-interdigitation of the buccal cusps, after the eruption of the second molars, where perfect dento-facial correction can only be attained without extraction by a distal movement of the buccal teeth one-half the width of a bicuspid or more—that are in natural or inherited positions in the mouth, or that have not moved forward from local causes—the extraction of the *first or second bicuspids* is indicated.

In cases of partial protrusion of the uppers and partial retrusion of the lowers, which demand an equally reciprocal movement of the labial teeth of both jaws to correct the facial inharmony after the eruption of the second molars, the extraction of the *second* upper bicuspids is indicated. This then should be followed by a protruding movement of all the lower teeth one-half the width of a bicuspid, the mesial movement of the upper molars the same distance, and a retruding movement of the upper labial teeth and first bicuspids an equal distance. This will close the spaces produced by the extracted teeth, and place the first bicuspids in normal occlusion with the lower bicuspids and the molars in the original mal-interdigitation of their cusps, with the preservation of the third molars in uncrowded eruption, which assures their most perfect condition, and with a masticating occlusion of all the buccal teeth that often is so perfect that only a dentist is able to discover that teeth are missing, and with a far greater probability of the teeth retaining their corrected positions than would be the case if they were crowded back to unnatural positions in the arch and subjected to strong influences continually tending to destroy the work of correction.

In cases where a distal movement of upper buccal teeth is demanded to an extent that is less than half the width of a bicuspid, we are approaching a field of corrections that should usually be performed without extraction. I hope, therefore, that the above malposition and the treatment will not be confounded in application with those cases of slight protrusion of the upper and considerable retrusion of the lower in which the teeth are in the same mesio-distal malocclusion, and in the correction of which without extraction the uncontrolled reciprocal

action of the intermaxillary force is particularly applicable.

To sum up these brief remarks, which I hope to more fully elaborate in a forthcoming paper, the question of the advisability of extraction and non-extraction should never be decided upon the basis of dental relations alone, but solely upon the possibility and advisability of correcting the dento-facial relations of the teeth as well as the occlusion, without extraction.

REPORT OF FIVE CASES OF ANKYLOSIS OF THE TEMPORO-MAXILLARY ARTICULATION.

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(Read before Section V, Fourth International Dental Congress, St. Louis, Mo., August 31, 1904.)

THE present paper is supplementary to that which I read before the National Dental Association at its meeting at Niagara Falls, in 1902, entitled "Bilateral Bony Ankylosis of the Temporo-maxillary Articulation of Traumatic Origin and Its Surgical Treatment: with Report of Cases I and II."* Five further cases are here reported, viz:

Case III. *Unilateral bony ankylosis of traumatic origin.*

Case IV. *Bilateral bony ankylosis of traumatic origin.*

Case V. *Bilateral bony ankylosis of traumatic origin.*

Case VI. *Unilateral fibrous ankylosis following operation for carcinoma.* (With the surgical treatment of Cases III, IV, V, and VI.)

Case VII. *Unilateral fibrous ankylosis following typhoid fever complicated with noma.* (With suggestions upon the surgical treatment.)

In this report I have avoided as far as possible a repetition of the points of interest discussed in my previous paper on the subject, and only allude to the questions that arise in connection with each case, in the hope of making it of more practical value to those who are especially interested in this work, and who can refer to my previous paper. Therefore, as a paper this report is necessarily incomplete.

Case III.

Unilateral bony ankolysis. E. T. of Pennsylvania, aged thirteen years, was kindly referred to me, December 3, 1903, by Dr. Edwin A. Heller of Philadelphia, Pa. He was a first child; the labor lasted three days, and terminated with a difficult forceps delivery. Certain peculiarities were not recognized until ankylosis was discovered. His mother by comparing his early condition with that of her subsequent three children, all of whom she nursed, recalls the following significant facts: He had difficulty, in nursing, in keeping the milk within his mouth and in swallowing. After dentition the nipple would frequently get caught between his teeth and was withdrawn with some difficulty, and not uncommonly injured, which finally resulted in a mammary abscess when he was one year old.

He had a severe abscess on the left side

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of the face when one and a-half years of age, was treated by Dr. Guy Hinsdale, who incised the abscess at three points—over the bridge of the nose; at the outer portion of the left orbital cavity; and one inch in front of and on a line with the external auditory meatus. At this time Dr. Hinsdale tried to examine his mouth and throat, but was unable to do so owing to the fixed position of the mandible, the sixth year of age he excised both joints with good results until death three years later from tuberculosis. It seems evident in this case that the marked degree of ankylosis preceded the abscess on the left side of the face, which, whether incidental or secondary to the ankylosis, in all probability helped to increase its intensity.

It is a remarkable fact that in most of

Fig. 1.



Fig. 2.



(*Case III.*)

which was at that time thought to be due to the abscess, which healed in one month. He was four years of age when it was definitely discovered that he suffered from ankylosis.

The etiology in this case is of special importance, and it is fair to assume that the injury to the mandible and the articulation occurred at birth and was due to the strenuous use of the obstetrical forceps. The etiology is similar to a case reported by Langenbeck, who gave as the cause, "Injury done at birth by forceps, in which both joints were involved." At these cases ankylosis is not discovered for months or years, even though positive symptoms pointing to that condition have been recognized, but without their significance being considered.

The physical condition of this patient presented many interesting features. The micrognathism (as shown in Fig. 1) is very marked. His facial measurements were as follows: From the hair line to the glabella was $1\frac{7}{8}$ inches; from the glabella to the point of junction of the nasal septum and the lip was $1\frac{7}{8}$ inches; from this latter point to the

point of the chin was $2\frac{3}{4}$ inches, from the point of the chin to the line of harmony was $1\frac{3}{4}$ inches. Therefore, the point of the chin was $1\frac{3}{4}$ inches behind and $\frac{7}{8}$ of shown in Fig. 2, due largely to the relatively closer position of the mandible to the maxilla. Aside from the usual malocclusion, the crowns of the anterior

FIG. 3.



(*Case III.*)

an inch below the place it should occupy. The median line of the mandible was slightly deviated toward the left side. The oral cavity presented conditions unusual even for cases of ankylosis, as twelve teeth were exposed, of the bicuspids about half exposed, and of the molars completely hidden. The buccogingival borders in the molar regions were in intimate contact but not united.

He introduced his nutriment through the space between the upper and lower incisors, the cutting edges of which were about on the same horizontal plane.

He could move the mandible in a lateral direction from left to right about 3/10 cm., and although there was comparatively little vertical motion it was evidently greater upon the right than upon the left side. Upon the lateral motion and this varying degree of vertical motion, the diagnosis of left unilateral bony ankylosis was established. This skiagraph (Fig. 3), taken by Dr. W. F. Manges of the Jefferson Hospital, shows the size and position of the mandible and its articulations, and to some degree it assisted in confirming the diagnosis.

Further examination in reference to prognosis and treatment elicited symptoms of paramount importance. Respiration was very greatly impeded and slight exertion caused dyspnea. His breathing was labored and noisy—in fact, ordinary respiration was noisy and required some voluntary effort. Since childhood his breathing when asleep was loudly stertorous. During the six months previous to the operation his parents noticed a marked increase of the respiratory difficulty; he was no longer able to sleep in a recumbent posture, but in a chair with his head leaning well forward. Several times during the latter three months his parent's attention was called to him during the night and they thought he would strangle.

Having kept him under observation for almost three months, and as there was no improvement, but on the contrary a noticeable increase in the respiratory difficulty, upon the earnest solicitations of the patient and his parents I decided to operate.

The choice of the anesthetic in this case troubled me greatly, and I decided to use a local anesthetic. I preferred eucain owing to its comparatively low toxic qualities, fearing the complications which I thought would inevitably result should he be given ether. The vivid recollection of having been compelled to do a quick laryngotomy for respiratory obstruction about the close of my second operation upon my second case—whose condition, although similar in many respects, was not so pronounced—was certainly not encouraging.

After his admission to the Jefferson Hospital, I had an opportunity to study the respiratory phenomena during sleep in a recumbent posture. He would have a full, deep, and loud stertorous inspiration followed by three or four abortive inspirations, during which times the sides of his chest would be forced in and quite marked cyanosis would develop, when a general contortion or convulsive movement would take place accompanied by a greater degree of cyanosis, and followed by relaxation, when the full and long inspiration would occur to which I have already alluded. There was a continued repetition of the above phenomena and the patient would move all over the bed and assume many different attitudes. This demonstration further convinced me that a general anesthetic would be a perilous undertaking, and yet I feared the success of a local agent when I had so much bone to remove and in that particular location.

Operation, February 23, 1904. The soft tissues in the region of the left articulation were carefully infiltrated with 20 minims of a 2 per cent. solution of beta-eucain, during which the patient had symptoms of syncope from which he soon reacted. The operation of subperiosteal excision of the callus including the head and neck of the condyle, as described in my previous paper, was carried out rapidly and successfully. The patient conversed and several times sang short nursery rhymes, and only occasionally gave slight evidence of pain and required to be restrained. As soon as the section was completed the mandible dropped and he immediately opened his mouth three-quarters of an inch, and was delighted. His pulse improved during the operation, and after applying the dressing I counted it, and found it was 82 per minute, full and regular. He remained in the operating room for fully twenty minutes after the operation was completed, and as he was considered to

be in good condition I allowed him to be taken to his room under the care of Dr. Thos. C. Stellwagen, Jr., who had assisted me. When he reached his room he conversed with his mother and showed her how far he could open his mouth, and afterward drank some water. Dr. Stellwagen after remaining fifteen minutes left him, believing that he was doing well and being assured by his mother that he was breathing as well as before the operation. Ten minutes later, while in the care of two nurses, he became cyanotic and struggled from their grasp, stood up in bed and fell back unconscious, with complete respiratory arrest. The resident surgeon saw him immediately and instituted artificial respiration, also traction upon the tongue and mandible. About two minutes later I saw him, and although he still had a feeble pulse he did not respond to our further efforts. His death was certainly due to failure of respiration, as his pulse did not begin to fail until extreme cyanosis developed, but it was quite impossible to ascertain definitely the cause of the obstruction.

I have been criticized for not remaining with my patient, and I deeply regret not being present, but had not the least intimation or thought of such an occurrence at that time. Had I had the opportunity to do a laryngotomy or tracheotomy, it is possible he could have been restored.

The prognosis of this case was decidedly unfavorable. Had an attempt to relieve him been withheld he would have probably strangled to death in the near future, as any incidental inflammatory affection of the upper respiratory tract would have been extremely dangerous and practically beyond control. The danger incident to the surgical treatment is in proportion to the amount of respiratory difficulty, and this is largely dependent upon the time at which ankylosis occurs. This point is discussed in my previous paper.

The fact that simple fixation of an articulation will not produce ankylosis is very clearly and forcefully demonstrated in this case. Although the right temporo-maxillary articulation had lain practically immobilized during the entire life of the patient, it was readily movable as soon as the opposite articulation was made free. Had he survived, it is my firm conviction that practically normal function of the right articulation would soon have been re-established.

In a similar case, I am at present undecided as to whether I would advise a preliminary tracheotomy, or proceed along the same lines. Although there was no evidence of toxic symptoms from the use of the eucain, I believe that the greatest care should be exercised in avoiding every possible agent that might weaken the patient. In a similar case I would at first employ a weaker solution, using later a stronger solution if I found it absolutely necessary.

One significant fact has been impressed upon me in each and every case: these patients have comparatively little strength or recuperative power when

Fig. 4.



(*Case IV.*)

compared with our general surgical cases, and I believe that the explanation of this lies in the fact that their nourishment has been limited practically to liquid foods.

Case IV.

Bilateral bony ankylosis. E. McD. of Pennsylvania, aged thirteen years, kindly referred by Dr. Justin G. Schwerin of Philadelphia, Pa. When eight and one-half years of age he fell from the roof of a box-car, striking his face on the cinder bed. He was taken to St. Mary's Hospital, where the resident physician, after examining him and suturing a severe lacerated wound of the lower lip and one of the chin, said that the mandible was fractured. He was discharged from the hospital on the following day and returned to the dispensary for further treatment. The wounds were healed in one week and no further notice seems to have been taken of the fractured mandible. About four months later he entered St. John's Home, and it was then discovered that he had ankylosis.

He was given ether on two occasions at one of our hospitals, and the surgeon used wedges and mouth-gags, and subsequently strenuous efforts were made to maintain what was gained in this way, but without success.

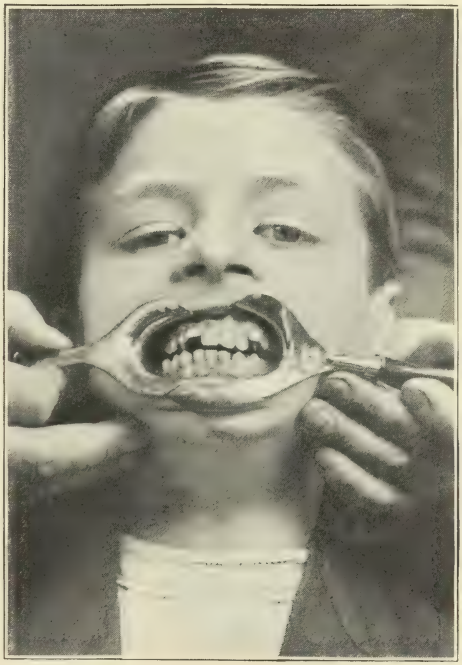
His condition previous to operation is illustrated in Figs. 4, 5, and 6. His facial measurements were as follows: From the hair line to the glabella, 2 inches; from the glabella to the junction of the nasal septum and lip, 2 inches; and from the latter point to the point of the chin, $2\frac{3}{4}$ inches. From the lower border of the zygoma to the angle of the mandible on each side, 2 inches, and from either angle to the symphysis menti, $3\frac{1}{8}$ inches. The lower border of the cricoid cartilage is $1\frac{1}{4}$ inches above the upper border of the manubrium. There is a transverse cicatrix over the point of the chin $1\frac{1}{2}$ inches long, a second parallel with the

Fig. 5.



(*Case IV.*) The occlusion.

Fig. 6.



Extent of separation.

lower lip and $\frac{1}{4}$ of an inch beneath its free border, which is $1\frac{3}{4}$ inches in length. The upper right lateral incisor is displaced outward, due to his forcing food into the mouth through that space. He can voluntarily separate the anterior teeth 3/10 cm., as shown in Fig. 6. Two excellent skiagraphs which were taken by Dr. W. F. Manges of the Jefferson Hospital showed the mass of bone uniting the ramus to the zygoma, and the position of the mandible. There was no special evidence of any respiratory difficulty.

Operation, June 28, 1904. Ether was administered by Dr. William P. Hearn, and a subperiosteal excision of the right condyle and bone successfully performed. On July 5, 1904, the left side was similarly treated, and in neither instance was there any special difficulty or dangerous symptoms encountered.

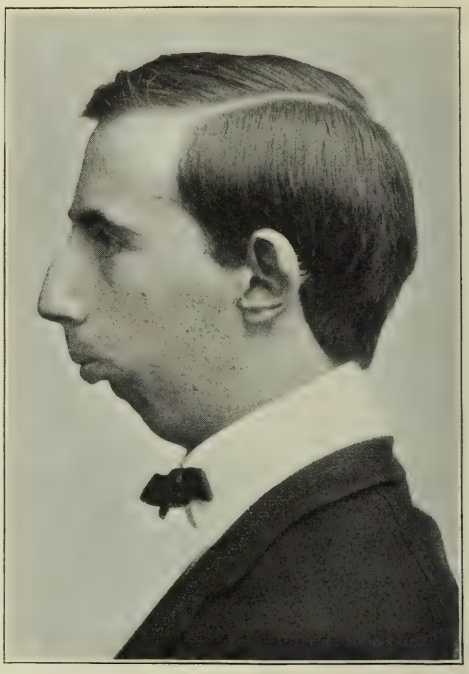
In this case I withheld the use of the mouth-gag at the time of operation, depending upon the subsequent use of it. He was able to open his mouth without any stretching fully three-quarters of an inch. After two weeks I began the use of the gag, but owing to the pain caused by even very gentle pressure upon the teeth I was unable to use it to any advantage. Since then he has been etherized three times and moderate force has been used to stretch the tissue, with the result that he can voluntarily separate the anterior teeth $1\frac{1}{4}$ inches. He is able to masticate solid food and can exert very considerable force, but has no lateral motion.

A very gratifying result in this case was the entire absence of any paralysis of the muscles supplied by the malar and infra-orbital branches of the temporo-facial division of the seventh nerve. In my first two cases temporary paralysis of these muscles occurred, from which both completely recovered in the course of two months.

Case V.

Bilateral bony ankylosis. J. W. McC. of Alabama, aged nineteen years. In association with Dr. M. I. Schamberg: we conferred and operated upon this case together. When four years of age, while sliding down a baluster the patient fell, striking his face and chin upon the floor. He bled profusely from mouth, nose, and ears, and subsequently some degree of fixation of the mandible was noticed; but it was not definitely discovered until three years after the accident, at which time he was examined by a dentist, that true ankylosis was present.

Fig. 7.



(*Case V.*)

When ten years of age he was operated upon by a leading surgeon of Nashville, Tenn. Although I cannot say definitely what the nature of the operation was, I judge that it was a bilateral osteotomy. When in the hospital he was able to get a ripe grape in his mouth without breaking it. Soon afterward ankylosis gradually returned and was almost complete within three years.

When fourteen years of age he was treated by an osteopath in Atlanta for five months, with some improvement, being able to introduce two fingers between his anterior teeth; but again firm fixation of the mandible occurred.

I first saw him on August 2, 1904, and there was only a perceptible degree of movement, probably not more than 1/50 of an inch. (See Fig. 9.) There was marked micrognathism associated with considerable fulness immediately below the mandible, as shown in Figs. 7 and 8. His facial measurements were as follows: From the hair line to the glabella, $2\frac{1}{2}$ inches; from the glabella to the junction of the nasal septum and the lip, $2\frac{1}{2}$ inches; from the lateral point to the point of the chin, 3 inches. The upper border of the cricoid cartilage is $2\frac{1}{2}$ inches above the manubrium. The median line of the mandible is about opposite to the median line of the face. The point of the chin is 4 inches from each point which corresponds to the site of the temporo-maxillary articulation, and 2 inches posterior to the line of harmony. There is no respiratory difficulty and he has only occasionally stertorous respiration during sleep.

Operation, August 16, 1904, at St. Joseph's Hospital; ether was administered by Dr. William P. Hearn. We performed an excision of the bone in the region of the right articulation without experiencing any special difficulty. In this case we both tried the use of the surgical dental engine which Dr. Schamberg kindly provided, and although we did quite satisfactory work with it, we decided we could accomplish as much if not more by the use of the chisel.

On August 24, 1904, we did the same operation upon the left side, and when the section was complete the mandible dropped about half an inch. When the patient was partially recovered from the ether I used the mouth-gag to stretch open the mouth more widely, and was able to separate the anterior teeth quite readily $1\frac{1}{2}$ inches, and could move the mandible laterally to a considerable extent.

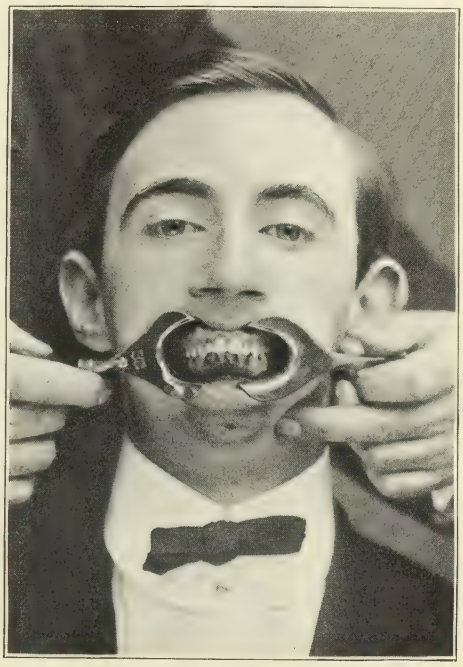
I last saw him two days after the operation, when he was sitting up and convalescing most satisfactorily. We are

Fig. 8.



(*Case V.*)

Fig. 9.



The occlusion.

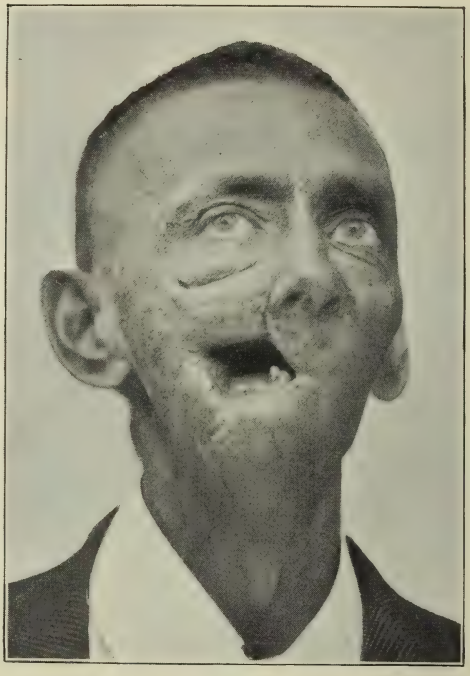
quite confident that he will have not less than $1\frac{1}{4}$ inches of free voluntary movement. Dr. Schamberg will institute active and careful measures to bring the mandible forward, correct the malocclusion of the teeth, and possibly spread the arch, and I hope will at a future time be able to make a most satisfactory report of the results.

Fig. 10.



(*Case VI.*) The occlusion after operation.

Fig. 11.



Extent of separation after operation.

Case VI.

Unilateral fibrous ankylosis following operation for carcinoma. N. B. of Texas, aged forty-eight years, referred by Dr. Irwin of El Paso, Texas, and under the care of Prof. J. Chalmers DaCosta and the writer. Two months previous to his admission to Jefferson Hospital, November 17, 1903, he first detected a small growth upon the buccal mucous membrane on the right side, about opposite the lower third molar. The growth rapidly developed, and upon admission it extended anteriorly as far as the angle of the mouth and involved all of the buccal mucous membrane and the alveolar process of the mandible and of the maxilla in the molar regions. It also had extended through the skin about the center of the cheek, and practically involved all of the soft tissue on the side of the face. A section of the tissue was examined histologically and proved to be a squamous-celled epithelioma. On November 28, 1903, we attempted the removal of the involved tissue, and after making an incision and exposing the interior of the mouth, we found it extended posteriorly and involved the tissues in the region of the tonsils. Considering the case inoperable we closed the wound, and eleven days later we excised the external carotid and a portion of its branches, and a week later did a similar operation upon the left external carotid, doing a modified Dawbarn operation for the starvation of malignant growths.

Three days later, the right side of his face was exposed to radium-bromid of a radio-activity of 900,000 for twenty minutes, and this was repeated daily for eleven days, increasing the period of exposure to forty minutes, after which exposure to the X rays was begun and was alternated with the radium treatment. There was a gradual shrinkage and decrease of the malignant tissue, and on April 21, 1904, we gave him ether and removed, with scissors and curette, portions of malignant tissue which remained.

As the case progressed a considerable degree of ankylosis resulted from the contraction of the cicatricial tissue which

Fig. 12.



(*Case VII.*) The occlusion.

Fig. 13.



Extent of separation.

remained, and the mandible became absolutely fixed, with almost no space through which to take nourishment.

On June 28, 1904, we gave him ether and I removed a section of the mandible one inch in length from the middle portion of the right half of the body, immediately in front of the cicatricial tissue, doing the method known as Esmarch's operation. The result has been most satisfactory, and at present he has free range of motion of more than one inch (see Figs. 10 and 11)—obtained without any subsequent stretching or active manipulation. This operation is certainly the one of choice, especially in unilateral fibrous ankylosis of severe type. It affords a decisive and permanent relief, which to the patient severely afflicted is an important consideration. Patients with less severe lesions and in practically normal health can withstand more prolonged and less radical means for their relief.

Case VII.

Unilateral fibrous ankylosis following typhoid fever complicated with noma: with suggestions upon the surgical treatment. Mrs. C. A. of Pennsylvania, aged nineteen years, was kindly referred by

Drs. L. H. Bernd and Joseph Fabiana of Philadelphia. In September 1901 she was admitted to the Pennsylvania Hospital suffering with typhoid fever, which later was complicated with gangrenous stomatitis of the left buccal mucous membrane. While very ill and delirious she was etherized and the gangrenous tissue removed with a sharp curette. As healing progressed, some degree of fixation of the mandible was noticed, and when at the expiration of two months she left the hospital, a marked degree of ankylosis with evidence of a localized necrosis of the maxilla was present. She returned in fifteen days, was etherized, the necrosed bone was removed, and the cavity curetted and packed.

The mouth-gag was then used to stretch and overcome the resistance of the contracted scar tissue. She was then able to open her mouth about three-quarters of an inch, and for the following month the mouth-gag was used daily, and was then discontinued as the fixation had recurred. She again entered the hospital, in April 1902, and was operated upon and careful subsequent treatment instituted, with the result that the ankylosis recurred.

Her present condition is shown in Figs. 12 and 13. She can separate the anterior teeth 4/10 cm. and can move the mandible in a lateral and antero-posterior direction to about the same extent. The first and second bicuspids and first molar are absent from the left side, and the second bicuspid, first and second molars from the right half of the mandible. All of the molars in the maxilla had been extracted at the time of the second operation. There is a dense band of fibrous tissue upon the left side connecting the mandible to the maxilla which is about three-quarters of an inch wide and probably one-half of an inch thick, attached above to the alveolar process in the molar region, and below to the alveolar process in the region of the second and third molars.

The surgical treatment of these cases has been quite unsatisfactory in many instances. To incise the scar tissue is practically useless, as it rapidly unites. To attempt to force the mouth open by means of a gag would, if successful, probably cause a separation of the band of tissue at its attachments to the alveolar process or bone, carrying with it a portion of the bone. This also would soon reunite and prove entirely useless.

Dr. J. Ewing Mears, in the *Transactions* of the College of Physicians of Philadelphia, vol. ix, 1887, reported very satisfactory results in a case in which both buccal cavities were obliterated by cicatricial tissue, and in which the method by incision and excision of the scar tissue had resulted in three failures. His success was the result of a rather unique method which he instituted. In order to prevent the reunion of the scar tissue he caused mucous membrane to form over the ends of the severed tissue by passing a stout silk ligature around the band of tissue, and by gradually tightening it, causing it to cut through, and as it did so the mucous membrane formed over the new surface.

Operation upon this patient is being deferred for the present because she is nursing her second child. Upon my return I expect to operate, thoroughly excising this band of tissue with its attachments to the periosteum, preserving the mucous membrane and closing the wound entirely except for a small drainage opening. Although I have never operated upon a case of this kind, I am quite confident of good results, provided I get rapid healing of the wound.

THE TREATMENT OF FRACTURES OF THE MANDIBLE.

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(Read before Section V, Fourth International Dental Congress, St. Louis, Mo., August 31, 1904.)

AMONG the most difficult fractures of the bones which the surgeon is called upon to treat are those which involve the mandible, and the difficulties are increased in proportion to the extent of the traumatism, the degree of displacement of the fragment, the amount of bone tissue lost, the age of the patient, the state of health, the habits and environments.

Authorities are generally agreed that fractures of the mandible rarely fail to unite sooner or later—occasionally not till after many months, but finally some form of union either bony or fibrous is established. In an ordinary uncomplicated case of fracture of the mandible union is usually complete in three to four weeks. Where poor health or depraved habits exist—particularly the drink habit—union is often greatly delayed.

Imperfect apposition of the fractured parts is responsible for more cases of delayed union than all other factors combined. This statement holds equally true of fractures of the long bones. It becomes the duty therefore of the oral surgeon to adopt those measures of treatment which will the most surely obtain and secure a correct apposition of the fractured parts.

Classification.

Fractures of the mandible are usually classed under two heads, viz, simple and complicated—the complicated being divided into compound, multiple, and comminuted.

Simple, or uncomplicated, fractures may be passed over with the statement that they seldom present more than a slight displacement, and sometimes none at all, the patient not realizing that the bone is fractured except from the pain experienced from crepitus when the mandible is in use. This class of fracture rarely requires the employment of any special method of treatment other than ligating the teeth upon opposite sides of the fracture, and the application of a four-tailed bandage.

Complicated fractures are legion in number, and frequently tax to the utmost extent the ability of the surgeon to overcome their tendency, after adjustment to a normal position, to slip out of place and assume the original malposition, thus in many cases defeating his efforts to a greater or less extent and producing a malocclusion of the teeth and in some instances a more or less unsightly facial deformity.

Compound fractures which involve only a single break in the continuity of the bone and laceration of the overlying soft tissues are the least formidable of the complicated fractures, because as a rule there is but little displacement, and a simple method of treatment—such as the adjustment of an external splint, and bandaging, the application of fracture bands, or wiring together the teeth which are located upon the opposite sides of the fracture—is all that is called for. Hemorrhage from the inferior maxillary artery occasionally immediately follows the injury, and there is sometimes paralysis of sensation of that portion of the mandible and external tissues supplied by the inferior dental nerve. Paralysis, however, is never permanent, while infection usually follows the injury even after the most scrupulous attention is given to cleanliness and antiseptic methods.

Multiple fractures involving two or more breaks in the continuity of the bone

are usually accompanied with displacement of the fragments and proportionate injury to the soft tissues overlying them. Hemorrhage, paralysis, and infection are the usual complications. The simple methods of treatment just mentioned are of little value in these cases, and if wholly depended upon will prove a grievous disappointment, as many surgeons have found by humiliating experience. Suppuration, necrosis of bone, more or less facial deformity, and malocclusion of the teeth have been the usual sequelæ of such treatment. Multiple fractures are generally the result of severe crushing injuries or of gunshot wounds, and constitute the most difficult class of all the fractures of the mandible to treat without leaving a facial deformity, or a malocclusion of the teeth. I have seen many cases of this character and of multiple fractures which had been discharged from hospitals with ununited fracture or a serious facial deformity and malocclusion of the teeth. In some instances the teeth did not occlude upon the injured side by an eighth of an inch or even more, or the mandible was so shortened upon the injured side that all the teeth were thrown out of their normal occlusion, and mastication made well-nigh an impossibility. Such results are, in my judgment, a blot upon the fair name of surgery, and in the present day ought not to occur, and would not occur if the surgeon would recognize the fact that the oral specialist is much the better qualified by special education and experience to treat such cases.

Essential Conditions in Treatment.

The conditions which are absolutely necessary to the successful treatment of fractures, no matter where located, are: First, accurate adjustment of the fractured portions of the bone. Second, immobility of the parts until union has taken place.

In cases in which the bone is comminuted or a portion carried away, as in gunshot injuries, it will be impossible to bring the fractured parts of the bone into apposition without causing a shortening of that side of the jaw. It therefore becomes necessary to place the remaining fragments of the mandible in their normal position and maintain them in that position by an interdental splint or other mechanical device until the wound has healed, trusting to nature in the one case to unite the comminuted fragments or form new bone in their place, and in the other that new bone may be formed to take the place of the section lost; or failing in this, that a fibrous band may be formed of sufficient strength to support a bridge splint made after the plan suggested by Dr. Patterson[1] of Kansas City.

Reproduction of new bone to fill a space in the mandible caused by gunshot injury or a surgical operation is very rare. But your essayist had the good fortune to report such a case in the Dental Cosmos of October 1903,[2] which will be briefly referred to a little later on.

Adjustment of the fracture. Accurate adjustment of the fractured portions of the bone is by no means always a simple undertaking, particularly in those cases classed as multiple fractures occurring between the symphysis and the angle, for the reason that there is always a considerable amount of displacement of the fragments, caused principally by the power of the digastric, the genio-hyoglossus, and the mylo-hyoid muscles, which act upon the anterior fragment from below, dragging it downward and slightly inward, while the posterior fragment is drawn upward and inward by the action of the masseter, the temporal, and the internal pterygoid. The central fragment in the case of double fracture upon the same side usually overrides the other fragments externally. This overriding is generally due to the central fragment being formed at the expense of the external or buccal plate of both the anterior and posterior fragments, having the form of a blunt wedge with the apex directed toward the mouth.

The greatest displacements occur, however, in cases where the body of the bone is fractured upon both sides, in locations between the second molar and the lateral incisor. In those cases the central or anterior fragment is sometimes displaced downward to the extent of from

one-half to three-fourths of an inch, and inward an equal distance toward the tongue, the posterior fragments overriding the central fragment externally. In this class of fracture it is usual to find the central fragment formed at the expense of the internal or lingual plate of both posterior fragments, and having the form of a blunt wedge with the apex pointing outward or toward the lip.

Maintaining immobility of the fracture. These cases cannot be successfully immobilized except by two methods of treatment, namely, (1) interdental splints constructed upon the plans of Hayward[3] of London, who successfully employed it in 1858, and of Kingsley[4] who employed his in 1864, or upon the plan of Gunning[5] who first used this splint in 1861, and of Bean[6] who first employed his in 1864; or (2) by suturing the fragments together with silver or copper wire after the plan first suggested and successfully practiced by Dr. Buck[7] in 1847 and reported to the New York Pathological Society during that year, revised by Professor Hamilton[8] in 1858, and employed by Dr. Kinlock[9] in 1859. The details of constructing these various forms of interdental splints are known to all dental surgeons and therefore need not be described here.

The method of suturing with wire will be described later when detailing the operation in two practical cases treated within a recent period—one for ununited fracture of the ascending ramus, and the other for a compound multiple fracture with considerable displacement of the fragments. The wire suture operation has an advantage over all other methods for treating ununited fracture of long standing, for the reason that if the suture is properly placed it holds the fragment in perfect apposition and by reason of its presence stimulates the reparative process in the bone. In this class of cases, and also where the fracture in the ascending ramus is of recent date, the suture should be buried and allowed to remain. Such foreign substances left buried in the tissues are entirely harmless and I have never known removal to be necessary.

In operations upon multiple fracture and ununited fracture of the horizontal ramus it is not necessary to attempt to bury the suture, as this would entail the making of an extensive incision in the external tissues, with a consequent unsightly scar. In these cases the operation can be done from within the mouth, and the end of the sutures so placed that they can be readily reached and removed after the process of repair has been completed. That method which will the most surely secure accurate adjustment of the fragments of the bone and maintain their immobility will give the most successful results.

The successful oral surgeon never ties himself down to one method of treatment, for no two cases are exactly alike in character or individual features, and consequently require variation in methods, appliances, or operations, as adapted to the requirements of each individual case. The simplest method that is effective is always the best, and I believe this to be a sound principle by which to govern all operations for the treatment of this class of injuries. It has been my fortune to treat a considerable number of fractures of the bones of the face and I have always found the best results to follow the simplest methods of treatment.

The following cases, which will be briefly detailed, have presented for treatment during my assignment to duty at the U. S. Army General Hospital, Presidio, San Francisco, California, from September 1, 1901, to June 30, 1904. The cases appear in the order in which they presented, without reference to their classification. The patients were either soldiers or civilian attachés of the army.

Cases.

Case I. (C. A. Y.) Male; white; age twenty-one years. Was admitted to hospital October 20, 1901, with simple fracture of the mandible, left side, at the angle, and contusion of the left side of the face. The injury was received on October 19, 1901, by being struck in the face with the fist during a quarrel. Treatment consisted of placing fracture bands upon the first bicuspid teeth,

upper and lower, upon both sides of the mouth, and wiring the jaws together with figure-of-8 ligature; in this case and all which follow the patient was placed on liquid diet, the mouth irrigated after each meal with a solution of mercury bichlorid 1:1000, and a solution of hydrozone 1:4 used on rising and before retiring at night. There were no complications during the treatment and the patient was returned to duty on November 26, 1901, with union of fracture perfect and occlusion of the teeth normal.

Case II. (A. M.) Male; white; age twenty-seven years. Was admitted April 14, 1902, with compound fracture of the maxilla, left side, upper left first molar fractured, left side of the face lacerated, line of fracture horizontal through the maxillary sinus. Displacement slight. Injury received the day before by kick of a horse. Treatment consisted of placing the fractured bone in normal position and maintaining it in that position by closing the lower teeth upon the upper and holding them together by the application of a four-tailed bandage. Irrigation as in Case I. Case was complicated for a few days by infection and suppuration. Returned to duty June 1st, with slight scar in left cheek. Union of fracture perfect; occlusion normal.

Case III. (J. Q. Q.) Male; white; age twenty-four years. Was admitted to hospital November 2, 1902, with compound fracture of maxilla, right side. External wall of antrum crushed in. First and second bicuspid and first molar loosened. Contusion and laceration of right cheek. Injury received a few hours previously by a kick of a horse. Operation consisted in removing several spiculæ of loose and detached bone; after which the wound was irrigated and packed with borated gauze. No complications were present at any time. Patient returned to duty on December 10, 1902. Made good recovery; teeth became firm; opening into antrum closed. Slight scar on right cheek.

Case IV. (F. N. T.) Male; white; age twenty-six years. Was admitted to hospital November 9, 1902, with compound fracture of the upper alveolar process, involving the four incisor teeth. Displacement slight; upper lip much swollen and contused. Injury received the night before by falling from a moving street-car, while intoxicated. Treatment consisted of placing the fractured alveolar process in its normal position, and supporting it by passing wire ligatures around the incisors and attaching to the canine teeth. No complications developed at any time, and the patient was returned to duty December 20, 1902. Fracture united perfectly, and the incisor teeth are apparently vital.

Case V. (L. K.) Male; white; age twenty-three years. Was admitted to hospital June 27, 1903, with compound multiple fracture of the mandible at the symphysis and between the left lateral incisor and the canine. Central fragment displaced downward. Injury received about May 25, 1903, by being struck with the fist upon the left side of the mandible near the chin. Fractured bone placed in normal position and maintained by external splint and bandage. Case complicated with slight suppuration. This patient was not on sick report, and was *en route* to the Philippine Islands, with his regiment. Nothing more was done for him.

Case VI. (R. C.) Male; white; age twenty-four years. Was admitted to hospital, from the Philippine Islands, October 25, 1903; ununited fracture of ascending ramus, right side, directly above the angle; line of fracture horizontal to ascending ramus. Injury received about August 9, 1903, by being struck with the fist. Case complicated with suppuration and necrosis. Two pieces of necrosed bone removed. Treatment consisted of applying fracture bands and wiring jaws together. Returned to duty December 16, 1903. Union perfect; occlusion normal.

Case VII. (H. H. D.) Male; white; age twenty-four years. Admitted to hospital February 4, 1904, with compound fracture of the mandible at the symphysis. Displacement slight; motion at fracture considerable. Injury received February 1, 1904, by being struck with the fist. Face not bruised. Operation consisted of applying fracture bands to the

lower canine teeth, and securing the fracture in position by figure-of-8 wire ligature passed across the symphysis from one canine to another. Case was complicated with suppuration. Returned to duty April 5, 1904. Union of fracture perfect; occlusion normal.

Case VIII. (H. T.) Male; white; age thirty-two years. Admitted to hospital March 27, 1904, with compound fracture of the mandible, left side, through the region of the second bicuspid. Displacement considerable. Injury received the day before by being struck with the fist in a pugilistic encounter. This patient was a military prisoner. Operation consisted of applying fracture bands to the upper first bicuspid and upper first molar upon the injured side and to the right first bicuspid, and wiring the jaws together with figure-of-8 ligature. Patient was transferred to Alcatraz Prison to serve his sentence. The case was reported by the post surgeon of Alcatraz Prison, on June 1, 1904, as having made a good recovery.

Case IX. (G. E. A.) Male; colored; age twenty-five years. Admitted June 24, 1904, with compound fracture of the mandible, right side, through the alveolus of the third molar; first and second molars of right side decayed to the gums. Displacement of the fracture slight. Injury received by being struck in the face with a brass knuckle during a row in camp three days before admission to hospital. Operation consisted in applying fracture bands to the upper and lower first bicuspids on both sides and wiring the jaw together in the usual manner. Right side of face contused and swollen. Wound at fracture suppurating when admitted to hospital. July 10th, large abscess developed at angle of right side of mandible; opened and drained. August 20th, fracture united, and occlusion of the teeth normal, but there still remains a superficial abscess in the right cheek, which is rapidly healing. Patient will be returned to duty in a few days.

Case X. (D. M.) Male; white; age twenty-eight years. Admitted to hospital from Philippine Islands, with ununited fracture of the ascending ramus, right side, situated one-half inch above the angle; followed by a fibrous adhesion and false joint. Ramus was displaced forward. Injury had been received September 7, 1903, by his being struck in the face with the fist, and had been followed by suppuration and necrosis. Was treated for several months at First Reserve Hospital, Manila, P. I. Returned to the United States to be discharged by reason of termination of term of enlistment. Operation consisted in making an incision along the lower border of the mandible from opposite the first molar, right side, to a point just beneath the pinna of the ear, dissecting the tissues from the bone, removing the fibrous band uniting the fractured surfaces of the bone, freshening these surfaces with the surgical bur, raising the periosteum for the distance of half an inch from each end of the bone, drilling two holes in each fragment opposite each other, passing the wires by crossing them on the lingual side of the mandible. This brought the fragments well into position, and gave a normal occlusion of the teeth. The wounds in the external tissues were then closed with catgut sutures, the periosteum being first carefully brought together and united with fine catgut sutures. After this the muscular tissues were united in the same way with interrupted sutures, and the skin closed with a continuous catgut suture. The superficial suture in the skin was removed on the fifth day. Up to this time the wound bid fair to unite completely by first intention. On the seventh day slight swelling developed near the most dependent part of the wound. On the eighth day slight fluctuation was discovered, and the wound was opened and drained. On the fourteenth day suppuration had ceased. On the twentieth day after operation the wound was perfectly healed.

August 20, 1904: The fracture has united and the patient is able to masticate ordinary cooked foods. The occlusion of the teeth is normal and the function of the muscles of mastication has been so well restored that the patient can grit his teeth with such force that the sound can be plainly heard for a distance

of ten feet or more. This patient is still in hospital suffering from a medical disease.

Case XI. (E. M. Mc.) Male; white; age twenty-six years. Was admitted to hospital June 24, 1904, with compound fracture of the mandible, right side, between the second and third molars and upon the left side between the lateral incisor and the canine. Central fragment considerably displaced downward. Injury was received June 23, 1904, by being struck on the face with the fist in an altercation. Operation consisted of wiring both fractures from within the mouth: on the right side by drilling a hole in the jaw well down toward the middle third of the roots of the teeth between the first and second molars, passing the wire through the hole, and then behind the third molar, and twisting the ends of the wires together on the buccal surface of the mandible at the hole drilled for the passage of the wire. The left side was treated by drilling two holes in the central fragment between the central and lateral incisors, about one-half inch apart, and two holes at opposite points in the posterior fragment between the canine and the first bicuspid. The wire was so passed as to cross upon the lingual surface of the mandible, and secured by twisting the ends together. Bandages were also applied. Suppuration occurred from infection at time of injury, but subsided at the end of a week. August 3d the patient was allowed to absent himself from the hospital on pass for three hours, and returned very much intoxicated. August 16th the wire in the right side of the jaw became displaced and was removed. August 21st the wire was removed from the left side of the mandible. Both fractures had firmly united, and the occlusion of the teeth is normal. August 22d the patient was returned to duty.

GUNSHOT FRACTURE.

Case XII. (C. D.) Male; aged seventeen years; a Filipino boy acting as servant to an officer. Was admitted to the hospital May 31, 1903, immediately after the injury, with a gunshot compound comminuted fracture of the mandible, caused by the accidental discharge of a 38-caliber service revolver in the hands of another Filipino boy. The wounded boy was sitting upon the floor of the tent, the other was standing near the opening of the tent and upon the left side of the injured boy, when the weapon was discharged. An examination of the case revealed the following conditions: The missile entered the left side of the face, about one inch posterior to the angle of the mouth, and about one-half inch above the lower border of the mandible. The direction taken by the bullet was slightly downward and backward, passing through the left side, comminuting the bone, the first and second bicuspid and the first molar, passing through the tongue and right submaxillary gland, colliding with the lower border of the mandible upon the right side, at the angle, cutting out a semilunar section, but not causing a complete fracture at this point, and emerging upon the right side of the neck just beneath the angle of the mandible. Hemorrhage was quite severe, but was controlled by packing the wound with gauze and applying cracked ice to the mouth. Dressings were applied and secured by an occipito-mental bandage.

The swelling of the tongue and external tissues of the face was so great that no effort was made until June 7th to place the fragments of the jaw in normal relation. Upon a further examination of the case at this time it was found that a considerable section of bone had been comminuted and carried away, that the posterior fragment was displaced upward and inward by the action of the temporal, masseter, and internal pterygoid muscles, while the anterior fragment was displaced downward and inward by the action of the platysma myoides, digastric, genio-hyoglossus and genio-hyoid muscles. Swelling and suppuration were too great to permit of using any interdental support at this time.

On June 21st the swelling had subsided sufficiently to permit a plaster-of-Paris impression to be taken of the frac-

tured mandible from which to construct a Gunning or Hayward vulcanite interdental splint. On the 25th the splint was adjusted, and maintained in position by binding the jaws together with a four-tailed bandage. The splint was so constructed as to cover all the lower teeth, but only the upper bicuspids and molars. An opening for the purpose of feeding was made in the left side of the splint, where the lower teeth had been carried away. Considerable difficulty was experienced in adjusting the fractured parts of the bones to their normal position on account of the adhesions which had formed, but these were broken up under an anesthetic.

On the two following nights the patient disarranged the bandages, allowing the splint to slip from the mouth. This difficulty was overcome by having all the hair shaved from his head, and after the splint was again adjusted the jaws were firmly bound together by strips of surgeon's adhesive plaster about three-fourths of an inch wide and long enough to pass under the chin and over the crown of the head. The strips were applied with as much tension as possible. Three strips were used, and applied just in front of the ears, the ends lapping from two to three inches upon the crown of the head. By this method the mandible was held securely in its correct position, and by no effort of the muscles was it possible for the patient to again dislodge the splints.

During the progress of the case several abscesses formed under the right side of the mandible and in the cervical glands, from which numerous small pieces of bone, tooth-structure and fragments of the bullet were discharged. An abscess also formed upon the left side of the mandible. The patient was confined to a strictly liquid diet through the entire period of his treatment, but gained eleven pounds in weight during this time.

Thirty days after the final adjustment of the splint and fifty-seven days after the injury, the splint was removed for the purpose of noting the progress in the process of repair, and it was found that the fractured bone was fairly well united, and the occlusion of the remaining teeth perfect. The muscles of mastication were slightly stiff from disuse. The splint was again adjusted and maintained in position by the aid of the adhesive strips.

Eleven days afterward the splint was again removed and the fracture found to be so firmly united that its further use was unnecessary.

On August 15th—or seventy-six days after the injury—the boy was discharged cured, and in as good condition as before the accident, save for the loss of three teeth and slight scars upon the right and left sides of the face.

SPECIAL FEATURES OF THE CASE.

There are several interesting features in the history of this case.

(1) The bullet in its course through the face comminuted the left side of the mandible and the first and second bicuspids and the first molar, carrying the fragments before it into the tongue and the right side of the neck, where they afterward produced abscesses.

(2) The bullet was one of the soft-nosed variety, and in its passage through the bone was more or less deformed and split up, as was evidenced by the fact that seven pieces were afterward discharged from the wounds and the abscesses which formed in the mandible and neck in the later history of the case.

(3) Although the bullet came in contact with the mandible at the right side, cutting out a semilunar notch from the lower border and body, it did not produce a complete fracture in this region. This, I am inclined to think, was due to the short range and high velocity of the missile as it passed through the bone. Had the range been longer, and the velocity consequently diminished, the damage to the bone would have been in all probability much greater.

(4) The loss of bone tissue from the left side of the bone was considerable, and I feared the gap was too great to be filled in with new bone, and that an ununited fracture or a false joint would be

the result. With this fear in view, the construction of the Gunning or Hayward splint was decided upon, as it would best hold the ends of the fractured jaws in their proper relations and secure absolute immobility. The application of the four-tailed bandage is the usual means employed to maintain the proper occlusion of the teeth within the splint, but in this case it proved a signal failure. I therefore adopted the method of shaving the head and binding the jaws together with the strips of adhesive plaster. This prevented the patient from moving the jaws in the slightest degree and secured the immobility of the fracture, which was in this case so desirable. This method of shaving the head and binding the jaws together is not new with me, as I have employed it in several cases in civil practice before I entered the service.

(5) The bullet in its passage through the floor of the mouth passed through the right submaxillary gland, and it seemed at one time in the history of the case as if it would be difficult to prevent the establishment of a salivary fistula beneath the jaw. During the healing of the wound the patient was cautioned to lie upon the left side when in bed, that gravity might carry the secretion of the gland into the oral cavity through the sinus which still remained open into the mouth beneath the tongue. Every effort was of course made to keep the oral opening of this sinus patulous, so as to favor the discharge of the salivary secretions into the mouth; while the external opening was stimulated with silver nitrate to promote rapid granulation and healing, with the result that a salivary fistula was prevented.

(6) Although the splint was worn continuously for forty-one days—thirty days without removal, and again eleven days without removal—the only effect upon the temporo-maxillary articulation from this long immobility was a slight stiffness of the muscles and ligaments, which entirely passed away after a few days of use.

(7) Reproduction of so large a section of bone following such an injury of the mandible is by far the most remarkable feature in the case. Reproductions of extensive portions of bone in the mandible following necrosis have been reported from time to time, but I do not remember to have read of a case of such extensive loss of tissues from a gunshot injury or a surgical operation in which the bone was reproduced and the mandible restored to its normal condition—which goes to show that nature, under the favorable conditions of youth, health, and a little intelligent assistance upon the part of the surgeon, will sometimes produce results that seem to our limited understanding of her resources next to marvelous.

BIBLIOGRAPHY.

1. Marshall. "Injuries and Surgical Diseases of the Face, Mouth, and Jaws." Second edition, p. 196.

2. Dental Cosmos. Vol. xlv, p. 778, 1903.

3. Kingsley. "Oral Deformities." Edition 1879, p. 399.

4. *Ibid.* p. 384.

5. Hamilton on Fractures and Dislocations. Seventh American edition, p. 149.

6. *Richmond Medical Journal,* February 1866.

7. *New York Journal of Medicine,* March 1847, p. 211.

8. *Buffalo Medical Journal,* vol. xiv, p. 148.

9. *American Journal of the Medical Sciences,* July 1859, p. 67.

MANUAL TRAINING AS CONDUCIVE TO THE HIGHEST FORM OF DENTAL EDUCATION.

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(Read before the Northeastern Dental Association at its tenth annual meeting, Hartford, Conn., October 20, 1904.)

THE human infant, unlike the animal, is born in a state of absolute ignorance and utter helplessness, having everything to learn and acquire. It may be said to consist of soul and body plus innumerable potential tendencies received from a long line of ancestors, but it possesses nothing of what is known as *mind*. This is developed through the agency of the sense organs of the body.

As Spencer in his work on "Education" says, "The mind grows. Like all things that grow, it progresses from the homogeneous to the heterogeneous. The mind consists at first of but few active faculties successively awakened, and ultimately comes to have all its faculties in simultaneous action."

Again, in his "Psychology" Spencer says, "But mind is not wholly or even mainly intelligence. Not only do feelings constitute the inferior tracts of consciousness, but feelings are in all cases the materials out of which, in the superior tracts of consciousness, intellect is evolved by structural combination. Everywhere, feeling is the substance of which intellect, when it is present, is the form."

The last quotation recognizes the twofold nature of mind; but in the place of *feeling*, as used by Spencer, we shall use the term *will*, remembering that feelings are the manifestations of the will. Mind may, then, be restated as the activity of the will, which, aroused or awakened by means of sense impressions pouring into the body from the environment through the sense organs, is determined or actualized in corresponding acts or thoughts of intelligence.

Each individual infant, therefore, may be considered as possessing an active will principle which is constantly and forever seeking to manifest and actualize itself. But if the mind grows, its growth is due undoubtedly to the fact that the nerve apparatus, which is its organic machine, is more and more perfected. Hence the infant at birth cannot think, reason, or walk, because certain elements of its nervous system are as yet undeveloped, but with growth of body there is a corresponding growth of mind.

Preyer has shown that at birth the sense organs of touch, taste, and smell are capable of receiving and transmitting sense impressions, that sight is a later development, and that the organ of hearing is perfected last of all. Not that these organs cannot receive impressions, but they cannot be transmitted to the cerebral cortex to produce sensations.

The organs of sense may be classified in two distinct groups or series. Touch, taste, and smell are those of the body and arouse bodily activities; sight and hearing, on the contrary, arouse emotional activities.

In the first group there is actual contact of the external substances with the sense organs. Thus, in touch, with the nerve endings in the skin; in taste, of substances in solution, with the papillæ of the tongue; and in smell, minute particles from substances floating in the air striking against the mucous membrane of the nose.

In a certain way, all the senses are ultimately merged into that of touch, which is called the *common* sense. In the case of hearing, activities in the air, arising at an indefinite distance, are transmitted, and arouse corresponding

motion in the organ of hearing, and in the same way, ether activities, striking the retina of the eye, are transmitted as activities in the cortex.

Herein lies the fundamental fact of realism in the broadest sense of the word. The real world is one that we can actually touch; merely to see things is not sufficient, but we must come in actual contact with them by *touch* to be sure of their existence; and right here lies a very far-reaching pedagogical use. It is through the sense of touch that the deepest and most lasting impressions of things are made on the mind. Let the child touch, handle some object, and there is at once a fusing of all the other sense perceptions into that of touch.

But feelings in their lowest form are aroused by the first group of sense impressions, or those of the body, and in those feelings the lowest stage of the will is determined. When the infant lies at its mother's breast, through touch the various organic sense impressions are realized, and there is a general feeling of comfort, of pleasure. When the same infant is suddenly disturbed it has a corresponding feeling of discomfort.

Feelings, then, are those sensations which cause either pleasure or its opposite. In the earliest days of the child's life the feelings aroused are of a general nature. Thus, the child gains only general concepts of its environment. Later, as those feelings are in turn stirred and specialized, corresponding mental emotions are aroused and habits are formed. For example, in early days a general feeling of fear regarding certain objects is felt; later, through sight or hearing, impressions are renewed which bring back the earlier feelings and raise the general sensation to a mental feeling or emotion.

During its mental growth, therefore, the child passes through stages of distinctly different forms of activity. In its earliest stage, through the development of the senses in the kindergarten, it forms general concepts of things about it.

We have seen that the will is the active principle of which intellect is the form; it is also evident that the senses or sensations constitute a certain plane of will which finds its determination through the motor tracts and nerves. The secret of the kindergarten lies in the fact that all sense impressions are carried out in act, in *doing* something. In the making of gifts, in the occupations, playing of games, etc., all activities find realization in its truest sense.

In the succeeding stage, those general feelings and concepts become, so to speak, differentiated or specialized. To be more explicit, in the preceding stage the child has considered and gained concepts of things as wholes, of the uses of things as wholes. Thus, in the kindergarten stage, he has learned in a general way the use of a locomotive.

In a later stage of development this general concept of the use of the locomotive becomes specialized in the study of its constituent parts. In this way ideas are implanted and a certain plane of mind is formed. When the general voluntary impulses become particularized (specialized) by constant repetition, habits are formed and become the basis of moral life, while the plane of ideas forms the basis of intellectual life—for moral activity is the activity of the will; impulses and intellectual activity that of ideas.

But these ideas, unless they find some expression in act, are not fixed. All ideas, as far as possible, should be expressed in acts, for in this way habits are formed.

In the second stage the child passes out of the general or imaginative realm of the kindergarten, from the handling of the gifts, the occupations, etc., into a higher stage of *making things,* learning special uses of parts of wholes; and the lower plane of comparison is reached.

At puberty the child enters upon its third and still higher stage, in which the real ego—a ruling tendency—begins to manifest itself. There is an increase of vitality and energy at this time and a decided change in the moral life. It is the crucial moment and there is a marked awakening of the intellect. The youth says, "I will do something, I will be something," while with the child, life has

been as it were all play and fancy, dealing only with the externals of things.

The appetites and desires of the physical nature are a power for good or evil, and as this is a period when habits are being permanently formed, careful attention must be bestowed upon the tendencies governing the child's activities. Educators are recognizing more and more clearly that physical training is an outlet for the natural activities. Besides training and hardening the muscles, it develops the motor centers of the brain, arousing the mental faculties. Activity of some kind or other is absolutely essential for healthy development, and the mere absorption of abstractions is not sufficient. Youth must have a chance to do something—and to many a young man mental poise depends upon this. It is the period for manual training, games, laboratory work, etc.

Our old-fashioned system of education, and unfortunately much of the education of the present, is justly criticized as cultivating the intellect alone. Too often have we ignored the fact that the child has a body as well as a mind, and that it is through the former that the latter derives its education and growth. The constructive faculty in children is strong, and seeks outward expression in acts; the destructive faculty is also present to a greater or less degree, and must be transformed into the constructive faculty. If we would develop these activities to the extent of obtaining satisfactory results, we must look to rational methods of manual training.

Manual training is not, as the term might seem to indicate, simply a training of the hands; it is the training of the whole individual in which the hand plays a most important part. It is a curious fact that the first evidence of will in an infant is indicated by the voluntary movement of the thumb, which shows the close connection between the brain and the hand.

Take the musician. He might study music in the abstract, understand all the laws of harmony, train his sense of hearing to perfection and make himself a keen critic; yet, where would be the music? He must make use of his hand as well as of his other faculties, he must give himself up to constant "practicing" until some day he will sit at the piano and show you with what lightning rapidity the message is conveyed from the eye to the hand through the brain, leaving the performer free to put emotional elements into his music. And the true dentist, like the true musician, to become an artist must develop the infinite possibilities of his hand, until his fingers perform their duties unerringly, and as it were unconsciously, while the conscious or voluntary thought, it may be, is centered elsewhere.

Rev. Dr. Parkhurst, in speaking of the accuracy of David's aim when he slew Goliath, says, "But it wasn't his first stone; he had practiced while out there on the plains of Bethlehem watching his father's sheep, and the unerring shot was the legitimate result of his long training." And so the embryo dentist must practice and by doing learn to do.

When a youth becomes conscious that he can really create something, when he looks upon his delicate achievements, such as engraving in wood, iron, and other metals, when he surveys the results of his designing, drawing, and modeling, he is filled with a delight which will spur him to improve the quality of his work. He will begin to discriminate, to invent methods of obtaining better results, to grasp ideas of relations, to understand what is meant by law and order; in short, he will develop slowly, perhaps, but surely, like Plato's artist, who "arranges all things in order and makes one part to harmonize with another until he has achieved one whole."

In other words, the ideal dentist must be at once workman and artist, and produce work which is both serviceable and perfect, no matter what that work is.

The chief end of all true education ought to be the development of the intellect and the will. The education of the intellect ought to teach man to work more intelligently, and the education of the will should form the basis of his moral development, and the delight of being useful. The one great advantage

of manual training over the old education consists in the development of the intellect by means of its application to uses.

Only *personal experience* gives clear concepts; given clear concepts, the mind is in the most favorable condition for healthy activity; the memory is active, the imagination lively, the judgment sound. A method which begins with abstractions will, of necessity, induce confused images and vague thinking. Nature's way is from the concrete to the abstract, and manual training with its variety of concrete objects is, as far as is known, the surest path to sincere, clear-cut thinking. And this habit of clear thinking will give to the purely abstract studies which follow, a fulness of meaning which can never be comprehended by the child who begins to struggle with them at the very outset of his training.

Dealing with things in the concrete rather than in the abstract gives to men clearer ideas of the nature of things, and of the practical lines of human progress, than seems to be obtainable by mere study of such things in the abstract. Moreover, the study of abstractions by themselves tends to take a man out of social life, while the practical study of sciences brings us in contact not only with nature, but with men; and no matter what our vocation, "Each individual is only a small part of society; nor does he exist for himself, much less does society exist for him; but that alone is his which results to him from his usefulness in serving the public."

Even culture, traditionally supposed to be founded on the humanities, is defined by Goethe as aiming to give the power of broadly interpreting the data of the senses, to place the individual in the most advantageous position possible for understanding the world in which he lives and being of real service to some part of it. A culture separated from all ideas of utility is empty and purposeless. It is even worse, for the decadence of the ancient nations bears witness to the corruption resulting from the separation of culture and service.

The sciences are a good illustration of the difference between the old-fashioned abstract thinking and the concreteness of the present thought. During the middle ages it was accepted without question that education meant instruction in the humanities—that is, the ability to read and write fluently several dead languages and a highly developed agility in reasoning and speculating over abstract subjects. Objects of everyday life which men could feel and touch possessed no interest for scholars of those times. Kepler applied his knowledge of conic sections to the heavens, and when he had to explain the motions of the planets, again fell back upon his inductive reasoning, and said that each was governed and controlled by its own indwelling spirit. But it remained for Newton, a century later, to watch an apple fall and deduce the principle that was to make a real science of astronomy. This instance might be multiplied at will; it is the history of all our sciences. It ought by itself to prove the inestimable value of the study of *things*.

The history of education tells us the same story. In 1833, Parliament commissioned Sir Edwin Chadwick to examine the conditions of labor of the children employed in factories. The results of his investigations showed that children who spent half the day at the factory and the other half at school were in their tenth year superior in mental attainments to children in their twelfth year who had spent the full time at school.

The habit of honest, conscientious thinking formed by manual training is also an aid to the development of the child's will, but here many other factors are combined. The habit of observation involves accuracy; the development of the creative instincts leads to self-reliance, and the desire for perfection develops all dormant resources, together with patience and perseverance. Add to all this the interest that every boy feels in the work of his own hands, and is it not pertinent to inquire if there be a better method for properly developing the will? Through such training the will forms the habit of carrying out things in ultimates, and brings to all acts of life

the scientific knowledge that it has acquired.

If the candidate for a dental college should in preliminary examinations show himself capable of designing and making most of his own instruments and tools, would not that be a proof of the education of his creative genius and independence as well as a means of strengthening the foundation of his future career?

In the successful dentist four faculties must be more or less equally developed—(1) the mechanical, which is the foundation and on a lower plane; (2) the artistic, (3) the scientific, (4) the philosophical. None of these can be ignored, but the first two must be developed at an earlier period.

Not long since, a colleague said to me that he hoped the dental colleges would require of all matriculants the degree of A.B., to insure a respectable profession; and the trend of college requirements is certainly in this direction.

History teaches that many of the greatest men in the various activities of life were self-taught while engaged in manual labor. It is very evident that it was largely due to their environment and physical training that they acquired eminence in their professions.

Froebel formulated his educational principle as follows: "From life, through life, to life. That is, from living experience, through living thought, to living deeds."

The modern estimate of academic titles often carries with it fictitious values. The "A.B." frequently represents the study of a variety of diverse subjects which leads to no definite end. Sometimes it is a system of cramming under private tutors by means of which the proud possessor of the mystic letters has been able to pass examinations upon courses very infrequently attended. Should the "A.B." become the standard for entrance examination to our dental colleges, it will debar many men who have acquired a practical education representing a better fitness for the profession than that of the "A.B." alone—for, to obtain efficiency, the candidate should have the benefit of manual training before his twenty-second year.

Prof. Wm. James of Harvard University, in his article on "The Ph.D. Octopus," truly says, "America is thus as a nation rapidly drifting toward a state of things in which no man of science or letters will be accounted respectable, unless some kind of badge or diploma is stamped upon him, and in which bare personality will be a mark of outcast estate. It seems to me high time to rouse ourselves to consciousness, and to cast a critical eye upon this decidedly grotesque tendency. . . . . It interferes with the free development of talent, to obstruct the natural supply and demand, ... to foster academic snobbery by the prestige of certain privileged institutions, to transfer accredited value from essential manhood to an outward badge, to blight hopes and promote invidious sentiments, to divert the attention of aspiring youth from direct dealings with truth to the passing of examinations. Such consequences, if they exist, ought surely to be regarded as drawbacks to the system, and an enlightened public consciousness ought to be keenly alive to the importance of reducing their amount. . . . . It is indeed odd to see this love of titles—and such titles—growing up in a country of which the recognition of individuality and bare manhood have so long been supposed to be the very soul. . . . . Is individuality with us also going to count for nothing unless stamped and licensed and authenticated by some title-giving machine? Let us pray that our ancient national genius may long preserve vitality enough to guard us from a future so unmanly and so unbeautiful."

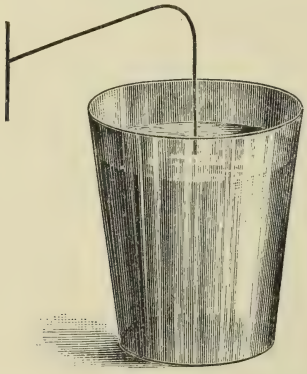
This is the testimony of a man who knows whereof he speaks—a man eminently able to set a just value upon mere academic honors. His testimony weighs heavily on our side of the balance. I ask your serious consideration of this subject.

ON THE MOLECULAR CHANGES IN AMALGAM.

By W. ST. GEORGE ELLIOTT, M.D., D.D.S., New York City, N. Y.

MANY years ago the spheroidal theory to account for the changes observed in amalgam was brought forward by Dr. J. Smith Dodge. This theory, although ingenious, never served to fully account for the changes observed. I have therefore taken up the subject with the

FIG. 1.



desire of ascertaining, as far as possible, what changes do occur and what remedies may be of value.

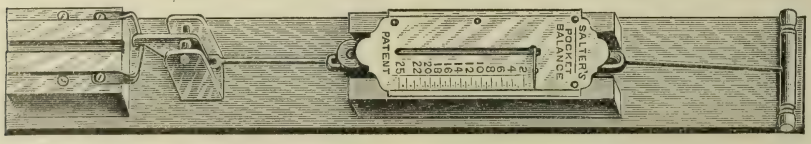
As far as the writer is aware, two processes have been used in testing for contraction and expansion. They are (1) the *mechanical*, as most ably presented by Dr. Black, and (2) the *specific gravity* test, as used by physicists.

In the *mechanical* test the amalgam (alloy and mercury) is packed in a steel tube open at both ends. To give an even, parallel surface, flat pieces of metal are placed on the amalgam at each end. The measurement is then taken from each end by a micrometer and is retaken from time to time as desired.

The objections to this mode of estimating change are that it depends for accuracy upon the skill of the observer in taking fine measurements, and that the possible errors are so many, and the facility with which they are made is so great, that they seem largely to destroy the value of the tests. I cannot see how it is possible to get parallelism between the two plates at the end of the steel cylinder. A slight molecular change in the surface of the amalgam must destroy the parallelism; and that there is more or less molecular change going on in amalgam I shall attempt to prove in this paper.

In addition to this objection, this mode of testing only takes into consideration the two surfaces. Whether there be change in the body of the amalgam will depend upon the packing or upon the molecular change—neither being in this method taken into account.

FIG. 2.



For the reasons given, I have made use only of the *specific gravity* test, my desire being to ascertain whether amalgam does or does not contract or expand in the process of hardening; whether the changes, if any, follow any known law,

and, if so, what steps can be taken to remedy the evil.

It is hardly necessary for me to describe how the specific gravity is obtained, as that is well known. Suffice it to say that the specimen of amalgam is weighed in the air, then in water, the specific gravity being calculated from the difference. As my object was not to ascertain the specific gravity, except incidentally, the calculations do not appear in all the tables presented; but the process gave me the means of knowing whether the specimen changed, and of measuring the amount of that change. It is perfectly evident that if a given weight of amalgam be suspended in water and balanced by an equal weight in the other pan of the balance, should the specimen change, such change must be shown by a change of weight; for with contraction the bulk of the amalgam in water is less, as it is greater in expansion.

Certain refinements in technique have developed from experience, and have materially added to accuracy of results.

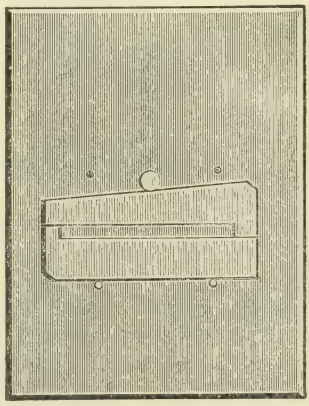
It is a matter of importance that the level of the distilled water should always be the same for each experiment. Consequently I had to discard the specific gravity bottle with its overflow. I used instead a pointer as per sketch. (Fig. 1.) The curved line leading from the glass is a fine wire fastened to the back of the assay balance which I use. This arrangement was found to be reliable and accurate, recognizing a change of a single drop in two ounces. As to temperature, I found it unimportant, as changes of 40° had but little influence on the results. Practically, however, the experiments were made at an even temperature of 70° F.

The assay balance I use is that of Ortling of London, and also the weights, the beam turning at $\frac{1}{4}$ mgm. To insure accuracy I did not rely upon the weights, as various combinations using a large number of weights do not always tally. I eliminated this possible error by not using the weights except roughly, relying upon the rider, as this gave me 20 points or milligrams on the beam. As practically all amalgams contract, the rider was placed about the middle of the right side of the beam, this giving me 5 points for expansion and 15 for contraction.

In addition to and in connection with the specific gravity tests, I have made a large number of breaking-strain tests. This was done by a testing machine devised for the purpose, as shown in Fig. 2.

In order to give a number of breakages, a briquet was made (on a steel matrix plate—Fig. 3), some 25 mm. long, 3.25 mm. broad, and 1.40 mm. thick, giving me about six breaks to the briquet.

Fig. 3.



The force required to break the briquet was shown by the spring balance.

In my earlier experiments I used disks of amalgam formed in a disk-former. But latterly I made use of the above-described apparatus as being more accurate and simpler. With amalgam too dry to be held by the wire it was compressed in a tube.

In 1883-84 I read a paper before the Odontological Society of Great Britain,* giving the results of experiments made twenty years ago, the tables of which I have here reproduced. (Tables Nos. 1, 2, and 3.) These investigations show that shrinkage is certainly a feature common to all the amalgams tested, contraction continuing for long periods of

* *Trans.*, vol. xvi, 1883-84, p. 161.

TABLE 1.—SHOWING SHRINKAGE, SPECIFIC GRAVITY, AND BREAKING STRAIN IN THIRTEEN AMALGAMS.

AMALGAMS.	Shrinkage — Expansion +			Specific Gravity.			Breaking Strain in lbs. Disks 7.30 mm. × 1 mm.				
	Dry.	Med.	Soft.	Dry.	Med.	Soft.	Dry.	Med.	Soft.	Best Results. *	Best Results. †
Stewart's Sullivan's	—30.9	— 5.2	—13.5	9.87	12.06	10.34	2	$2\frac{9}{10}$		Med.	Med.
Sullivan's	—28.5	— 1.2	— 8	10.77	12.65	11.64	3	$3\frac{7}{10}$	4	"	Dry
Bonwill's	—24	—14.8	—10.5	8.69	9.20	10.10	$9\frac{1}{2}$	$10\frac{2}{5}$	$6\frac{1}{2}$	Soft	Soft
Hallam's	—21.1	—16.3	— 7.5	8.62	9.78	9.28	$17\frac{1}{10}$	10	$3\frac{2}{5}$	"	"
Gregory's	— 5	— 6.3	—13.9	10.12	9.47	10.47	$15\frac{7}{10}$	$10\frac{1}{5}$	$12\frac{1}{10}$	Dry	"
Lawrence's	—23.5	— 6.9	— 5	9.08	9.17	9.52	$12\frac{7}{10}$	$9\frac{1}{10}$	$2\frac{9}{10}$	Soft	"
Fletcher's Flagg's Standard	— 2.6	— 6.6	— 2	9.69	9.17	9.43	$15\frac{1}{2}$	$5\frac{4}{5}$	$2\frac{9}{10}$	"	"
" Extra Plastic	+ 2.7	— 8.7	— 5.4	9.93	10.51	9.61	$8\frac{1}{10}$	$5\frac{3}{10}$	$5\frac{7}{10}$		"
" 2d Quality	—18	+14	— 7	9.35	9.95	10.35	$6\frac{1}{3}$	$1\frac{3}{5}$	$1\frac{9}{10}$	"	"
Ash's	—10	— 7	— 1	10.11	9.97	13.43	$11\frac{3}{5}$	$9\frac{1}{3}$	$10\frac{3}{5}$	"	"
Davis' Gold	—12	— 5	— 8.3	9.50	9.97	10.07	$9\frac{9}{10}$	$9\frac{7}{10}$	$8\frac{1}{5}$	Med.	"
" Crystal Gold	—22.5	— 8.5	— 3.5	9.34	10	10.25	11	10	$8\frac{4}{5}$	Soft	"
Nickold's	—13.4	— 3	— 3	9.51	10.05	10.10	$14\frac{1}{10}$	9.45	$8\frac{3}{10}$	Med. or Soft	"

* Showed lenst shrinkage. † Showed best breaking strain.

time, the amalgams sometimes expanding to their original condition, but generally failing to do so.

Referring to Table No. 1, it would seem that there was no relation between the specific gravity and the breaking strain, as in Hallam's, where we have a breaking strain of 17.1 lbs. and specific gravity of 8.62, while in Sullivan's, with a specific gravity of 12.06, the breaking strain is only 2.9 lbs. Neither is there any law as to the quantity of mercury that should be used—that is, no law common to all amalgams. Each must be a law unto itself. The following amalgams, Fletcher and Standard, Ash, Lawrence, Bonwill, Hallam, and Davis, give the best result for contraction when mixed soft. Ten specimens seem to be strongest when mixed dry. Bonwill's shrinks least when mixed soft, but is strongest when mixed medium.

We will now take up some of the more modern amalgams.

Fellowship. The intervals between observations are given in hours. (See Tables Nos. 4, 5, and 6.) Note the difference between the two graphic tables. The only similarity is in the general contraction, the expansion being exceptional.

TABLE 2.—SULLIVAN'S COPPER AMALGAM.

Showing the molecular changes during seven days.

Interval between Observations.	Dry.	Med.	Soft.
	mgm.	mgm.	mgm.
12 hours	1681.5	1806.3	1810.5
3 "	1703	1811.5	1817.5
4 "	1710	1814.3	1821.5
4 "	1709.2	1815	1819.4
12 "	1710.3	1812.2	1822.5
4 "	1713.6	1813.5	1822.5
6 "	1715	1815.5	1822.5
13 "	1715	1812.5	1822.5
4 "	1715.3	1811.5	1820.2
7 "	1710.5	1811.5	1818
11 "	1706.1	1808	1817.7
5 "	1706.5	1808	1817.7
7 "	1708.1	1808.3	1818.2
11 "	1709.1	1808	1820
6 "	1708.9	1809	1818.6
6 "	1709	1811.9	1827.7
36 "	1706.7	1809	1818.6
4 "	1706.7	1808.4	1820.9
6 "	1707.5	1809.3	1820.9
Shrinkage, max.	34	9	17
Final results	26	3	10

In some fifteen experiments with this amalgam no two were alike. And I may

say here that in addition to the general shrinkage, we have molecular changes going on; so that no two experiments give like results, even when taken from the same bottle. Table No. 6 gives the result of ten experiments with "Fellowship," only one of the ten showing expansion.

TABLE 3.—SULLIVAN'S AMALGAM.

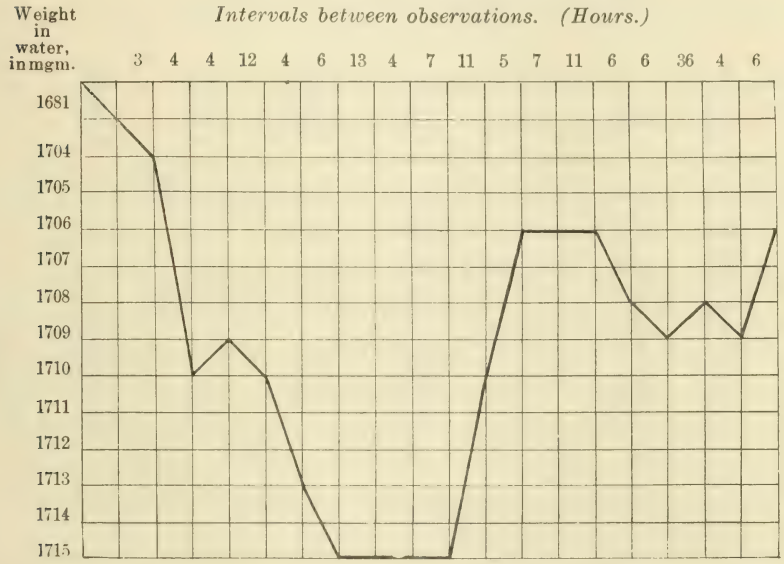
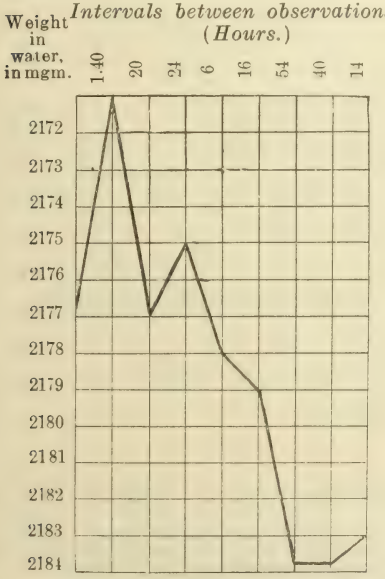
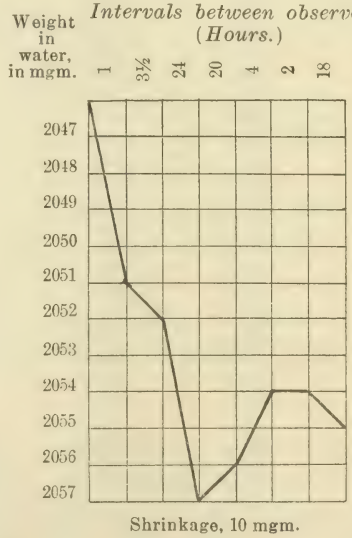


TABLE 4.—FELLOWSHIP AMALGAM.



Shrinkage, 7 mgm. from starting-point.
Maximum shrinkage, 12 mgm.

TABLE 5.—FELLOWSHIP AMALGAM.



Shrinkage, 10 mgm.

Dentalloy. In Table No. 7 we have the results of some twenty-two experiments, each lasting forty-eight hours, with in some cases the breaking strain, and in three cases the result of excessive mixing. While these do not show any advantage over mixing in the ordinary way, yet as far as one's experience goes, the most satisfactory way of treating amalgam in general is to use an excess of mercury, work it thoroughly, and squeeze through chamois—without pincers. This applies

TABLE 6.—FELLOWSHIP AMALGAM.

Experiment Number.	Weight of Alloy.	Weight of Mercury.	Mixed.	Consistence.	Weight in Water.	Weight in 2 Hours.	Weight in 24 Hours.	Weight in 48 Hours.	Shrinkage.
1	1 gm.	1033	2033	Very dry..	1837	1838½	1845½	.....	8½
2	"	1359	{2359 / 2853}	Medium...	2633	2637	2637	.....	4
3	"	2304	3304	Very soft..	3028	.....	3032	.....	4
4	"	707½	1707	Very dry..	1529	1529½	1531½	.....	2½
5	"	898	1898	" " ..	1723	.....	1726½	.....	3
6	"	1350	2350	Medium...	2145	.....	.....	2150½	5½
7	"	1870	2870	Soft.....	2625	.....	.....	2629¾	4¾
8	"	1596	2590	Medium...	2334	2335	.....	2335½	1½
9	"	1526	2526	" ...	2290	.....	2291	2294	4
10	"	1524	2524	" ...	2287	.....	2289	2286	1

TABLE 7.—DENTALLOY AMALGAM.

Weight of Mercury.	Weight in Water.	Weight after 48 Hours.	Shrinkage.	Breaking Strain in lbs.
700	1407	1410	3	2, 2½, 2, 2, 3, 3.
700	1345	1347	2	3, 4, 3½, 3, 4, 3½, 3.
747	1534	1547	13	
800	1575	1583	8	
1000	1554	1560	6	3, 3½, 3½, 3, 5, 5.
1000	1771	1774	3	6, 6½, 7½, 7, 7, 7.
1000	1570	1581	11	Squeezed in tube.
1200	1944	1949	5	4, 4, 3, 4.
1200	1947	1950	3	4, 5½, 4, 5.
1500	2238	2241	3	3, 2, 2, 2, 3.
1500	2222	2225	3	5, 5½, 5, 5, 4.
2000	1709	1712	3	
2000	1710	1715	5	
2500	1832	1836	4	Worked 10 minutes before weighing.
2500	1773	1790	17	" 5 " " "
2500	1820	1825	5	" 3 " " "
2500	1760	1783	23	
2500	1260	1266	6	
2500	1880	1896	16	
2500	1707	1715	8	
2500	.....	.....	...	
2600	2331	2336	5	
3000	1755	1783	28	4, 4, 8, 8.

Where the amalgam was too soft, as when 1 gm. alloy was mixed with say 1200 mgm. mercury and more, the mass was squeezed in chamois and excess of mercury squeezed out.

to the silver-tin alloys with a large proportion of silver. Where the proportion of tin is large more squeezing is requisite.

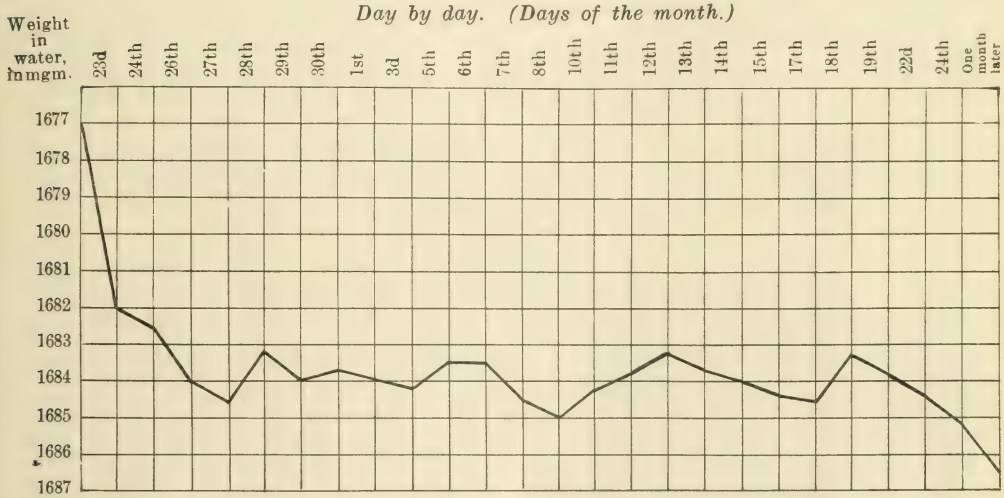
Acme. (Tables Nos. 8 and 9.) In the graphics shown there is the usual molecular change and general shrinkage, followed by irregular change.

Townsend. (Table No. 10.) While this is an old and familiar amalgam, yet as manufactured at present it probably partakes of the improved processes or rather manipulations common to modern methods. It certainly makes an excellent showing by our table.

Although I have conducted hundreds of experiments, and made out a large number of tables, yet in the main they follow those already given, showing no uniformity in these changes. Generally I have confined my observations to forty-eight hours, the exceptions being the tables giving "Acme" and "Townsend." Nor have I found that the more expensive alloys present any advantage,

TABLE 8.—ACME AMALGAM.

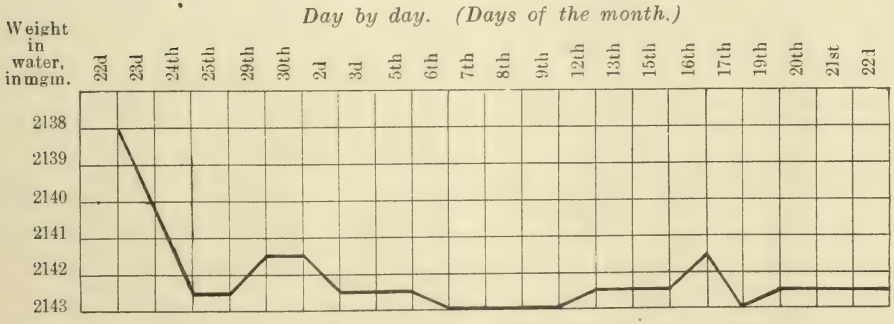
Day by day. (Days of the month.)



Shrinkage, 10 mgm. in two months.

TABLE 9.—ACME AMALGAM.

Day by day. (Days of the month.)

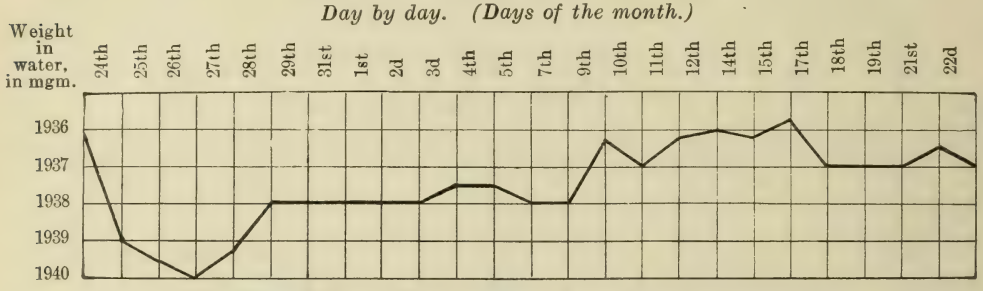


Shrinkage, 5 mgm. in one month.

"Twentieth Century" shrinking 6 mgm., 14 mgm., 5 mgm., 7 mgm., 10 mgm., etc., "Splendid" 9 mgm., "Sterion" 6 mgm., etc.

Table 10.—TOWNSEND'S AMALGAM.

Day by day. (Days of the month.)



Shrinkage, 3¾ mgm. Final shrinkage, ¾ mgm. from starting-point.

CONCLUSIONS.

As far as the writer knows, we have no amalgam that is quite reliable; his tests only confirming clinical observation. By reliable, I mean one that under proper manipulation will always give the same result. Nor can I give any hope that one will be produced in the immediate future, for the good reason that alloys are most sensitive to the presence of foreign matter. If we could get absolutely pure metals, we might have hope of getting some uniformity in results. One of the largest concerns in London told me they could not furnish pure metals—meaning at a commercial rate. Again, even if pure metals should eventually be produced commercially, yet, owing to the different specific gravity of the constituents of the alloy when fluid, they tend to separate and must be stirred while pouring, and even then we only get a mechanical mixture. Take any ingot intended for amalgam alloy and assay it at top and bottom, and notice the different proportion of the ingredients.

In Dr. Flagg's book he mentions *silver* as being the expansive agent. But my experiments go to show that silver, as pure as it can be bought, shrinks in hardening.

A good practical amalgam is one that does not shrink over, say, 4 points or mgm.—and remember, 4 mgm. in, say, 2000, which certainly is not much. The question naturally arises, If amalgam generally contracts, why is it found successful in practice? Two reasons present themselves—(1) The shrinkage is not nearly as great as the undercut in the cavity. But the principal reason is (2) that shrinkage causes leakage. Leakage results in oxidation or sulfureting—or, to use a familiar term, rusting; and this rust is to some extent antiseptic, and being of less specific gravity, or in other words more bulky, fills the crack.

Observation would go to show that shrinkage commences at once, and is greatest in the first few hours, so that it is a good plan to burnish amalgam fillings as long after their introduction as possible, and just before the departure of the patient.

An elaborate apparatus is not necessary in conducting these experiments. It is sufficient to have a stiff wire balanced on a fixed support and having a pan suspended from one end by a thread or fine wire, while the specimen of amalgam is suspended from the other end of the beam; then balance the amalgam suspended in water by weights or sand in the pan, having previously made a rider of fine wire to straddle the beam at any point, say in the middle of the right side of the beam. With the rider in position, see that the whole balances. Within one hour the amalgam will begin to sink in the water, and to readjust the balance the rider must be moved toward and beyond the center of the beam—the amount of movement indicating the shrinkage.

AN EXACT METHOD OF INLAYING AN INTRADENTAL RING.

By L. E. CUSTER, A.M., D.D.S., Dayton, Ohio.

THE roots of many of the anterior teeth which are to be crowned are often found so nearly circular in shape that a metal ring can be inlaid in the end of the root and a conspicuous band thereby avoided. This was done by B. J. Cigrand and J. Leon Williams some years ago. At that time a soldered ring was used, which was made and fitted without a system.

The method herewith presented is not only exact, but the details of constructing the ring are novel.

The method is this: The root having been prepared to receive the crown, select a Cigrand trephine (Fig. 1), which will cut a groove about midway between the pulp-canal and the periphery of the root. Cut the groove about 3/64 of an inch deep.

We are now ready for the ring, which is made in the following manner: A mandrel (Fig. 2) is tapered in size to meet all the cases. This is threaded at the smaller end to receive a thumb-nut. The mandrel is marked at points which correspond with the inside diameter of the trephines. Thin tubes, *a* and *b*, fit neatly over the mandrel.

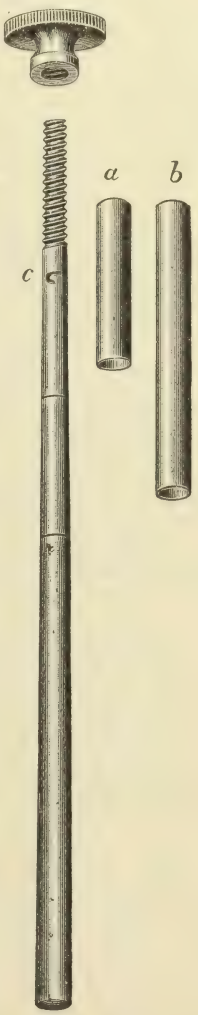
The ring is made thus: A piece of platinum wire No. 30 gage is caught at one end in the little hook-shaped depression *c*, and the mandrel is revolved two or three full turns according to the desired width of the ring. The spiral spring as we now have it is removed from the mandrel, the ends are trimmed and it is returned. With one of the tubes as a follower the ring is forced along the mandrel almost to the mark which indicates the size of trephine used in the case.

The ring is now removed from the mandrel and gold flowed in its spirals till flush. When polished, one has a seamless band whose width is determined by the number of turns of platinum wire. This is returned to the mandrel for the final fitting. This time the tube is followed by the thumb-nut, with which the ring is easily forced to

Fig. 1.



Fig. 2.



the proper mark upon the mandrel. This act in one movement gives the ring the exact size and a slight taper, and in addition thereto an increased hardness.

The ring is now removed from the mandrel and cemented in the root, observing that the larger end of the ring goes in first.

If the foregoing instructions have been followed it will be found that the ring not only enters the groove in the root, but actually binds upon the inner wall by the slight taper that was given it.

FUSING PORCELAIN.

By Mr. ROBERT BREWSTER, Chicago, Ill.

(Presented to the thirty-sixth annual convention of the Sixth, Seventh, and Eighth District (N. Y.) Dental Societies, at Buffalo, N. Y., October 25, 1904.)

OF all the operations connected with porcelain work, none are more important than the proper fusing of the material, and no part of the work seems to present greater difficulties to the beginner.

In dealing with this subject let us inquire, What are the difficulties? The main difficulty lies probably in our inability to correctly judge a fused piece of porcelain—to know whether it is properly fused through, whether it has had sufficient heat or too much heat; to know why we sometimes get porosity and at other times not; why the porcelain is sometimes rough instead of being smooth, and why the color is not always the same at each baking. It is safe to say that these and many other problems connected with porcelain work can be solved only by careful personal investigation.

It is a prevalent impression that it is better to under-fuse porcelain than to over-fuse it; that an over-fused piece of porcelain is not as strong as one under-fused. This is a mistake, and a serious mistake—at any rate with the porcelain with which I am familiar. Porcelain that is not fused sufficientiy to bring out the correct color has not its full strength. Its weakness is in direct ratio to the absence of color produced. Starting with a square pat of, say, the enamel body of good yellow shade, the stages may be described as follows: The first effect of the heat upon the pat is to whiten it—and it may be said here in passing that no porcelain is perfectly dry until it assumes that chalky white appearance. As the heat increases and the muffle reddens, reaching about 1700° F., the porcelain is now lightly biscuited—in about the condition to be filed with a steel file; but it is only, as its name implies, in a "biscuit" state, and has therefore no strength. The heat is now increased until the muffle is a brighter red, about 1800° F., the porcelain on examination showing some slight indication of color, but can still be filed. Replaced in the furnace and carried to 1900° F., more color of a brownish cast is produced, and its condition is that known as a hard biscuit. Carried now to 2016°, the fusing-point of gold, the color has assumed a yellow cast, and a surface much smoother than it was at 1900°. Carried another 50° higher, the color appears brighter and the surface smoother, but the finished surface is not produced, in this particular porcelain, until another 90° is added.

To make these points clear, I have

baked samples in two different furnaces, those in the Pelton furnace by taking the time after a cylinder of gold melts; the others in the Price pyrometer furnace, in which the heat is recorded on a dial. It will be well for those interested in the subject of baking porcelain to examine these samples carefully, because not only under-fused pieces are shown, but some have been purposely over-fused until the form and color have left them. These specimens show something beyond the effect of heat upon their color and surface; they record the shrinkage which takes place at the several degrees of heat.

The mold in which these squares were made opens on four sides, is open at the bottom, and stands upon blotting paper, no pressure being used in filling it; therefore all the porcelains made in it were subjected to exactly the same physical conditions. Tests have been made and published from time to time, wherein the various porcelains have been squeezed into tubes under varying pressure. This is not the condition under which porcelain is used, and the recorded results are therefore misleading. As an illustration, the shrinkage of a well-known continuous-gum body, as will be seen by the specimens, is greater than that of the enamel body used in these tests, both being made in the same mold. One reason is that the continuous-gum body is coarser ground; the particles stand farther apart before fusing, and naturally when thoroughly fused together occupy less space than the lower-fusing enamel body, the particles of which are finer and closer together before fusing, and the preparation of which insures solidity by mere extraction of the moisture. The over-fusing of this finer porcelain, as will be seen by the samples, does not cause porosity; the very much over-fused piece having been polished, and from laboratory tests the strength is not materially reduced.

The reason for porosity and consequent weakening of the porcelain is due to other causes, one of which is the fatal mistake frequently made by inlay workers of being in too much haste. Their patient is in the chair—they are anxious to complete the inlay quickly—the color perhaps does not come out just as they expected: they *hurry*—and when there is undue haste, inlay work suffers. Successful porcelain inlays take time to make, and incidentally demand adequate remuneration.

Porosity is frequently the result of inserting the mass of damp porcelain into too hot a furnace, crusting over the outer surface and preventing the steam from escaping. Another cause is laying the matrix containing damp porcelain upon the hot tray in front of the muffle door; the heat of the tray is immediately taken up by the metal matrix, and steam is formed between the porcelain and matrix, causing spaces which, when the fusing is completed, show as bubbles or porosity. The better plan is to lay the matrix upon a cool clay tray and insert gradually.

It is of course essential that sufficient vibration be given to get the particles of porcelain to the lowest point; and, in inlay work, porcelain should be used as dry as possible after being well mixed on the slab. Mixing the porcelain reminds one of the absolute necessity of keeping the mixing spatula bright. Beyond following the rule, "Never lay the spatula down without wiping it on a dry cloth," it should be kept *bright;* a dirty spatula is very frequently the cause of an off-colored inlay.

The correct fusing of porcelain is not such a difficult matter if the suggestions I gave eight or nine years ago are closely observed. The whole process is one of time. All kinds of furnaces are used; one reaches the average fusing-point of porcelain in two minutes, another in three minutes, another six minutes, and so on. Now, allowing that the electric current varies in voltage occasionally, which would cause an error in very lengthy time calculations, for instance, starting with a cold furnace, we reduce this error to its narrowest limits by taking account of the time after the gold melts instead of from the time the porcelain is put into the furnace.

Porcelain should be dried properly,

and allowed to assume the heat of the muffle before the current is increased; for, once the porcelain is as hot as the muffle, the heat may be increased as rapidly as desired without danger to the material. When the pellet of gold melts into a ball (a fresh pellet should be used for each bake), take account of the time, allowing seconds or minutes, according to the kind of furnace employed, for obtaining just the correct glaze and color of the porcelain. The baking of a few pats experimentally will give the exact time; and when once this is ascertained, a slight variation in voltage will have very little effect as between the melting-point of gold, 2016°, and the actual fusing-point of the material; but the error would be serious if timed from a cold furnace. Now, however, that we have such an excellent instrument as the pyrometer furnace, the variation in voltage gives no trouble, as the actual heat of the inside of the muffle is recorded on the dial.

The gold test, as it has come to be known, stands us in good stead in furnaces having gasoline as their heat power; given a known quantity of gasoline in the tank, and a given pressure of air, most excellent results may be obtained with a furnace constructed so as to give pure combustion, such as the Brophy No. 2 furnace. I have never failed to make excellent bakes in this furnace with gold as a guide.

One other point should be observed in relation to baking porcelain: Always allow the molecules to settle before withdrawing the molten porcelain into the air; ten or fifteen seconds after the current is cut off is usually sufficient time to allow for this purpose.

PROCEEDINGS OF SOCIETIES.

FOURTH INTERNATIONAL DENTAL CONGRESS, ST. LOUIS, MO., AUGUST 29 TO SEPTEMBER 3, 1904.

(Continued from page 376.)

SECTION V: Oral Surgery.

Chairman—G. V. I. BROWN, Milwaukee, Wis.
Secretary—ARTHUR D. BLACK, Chicago, Ill.

FIRST DAY—TUESDAY, AUGUST 30.

The meeting of this section was called to order by the chairman, Dr. George V. I. Brown of Milwaukee, Wis., promptly at 2.30 P.M., and proceeded at once to the consideration of the papers.

The Chairman called on Dr. THOMAS L. GILMER, Chicago, Ill., who read a paper entitled "Surgical Training in the Dental School," as follows:

SURGICAL TRAINING IN THE DENTAL SCHOOL.

Surgery of the mouth, face, and jaws is steadily becoming more to be considered an essential part of dental education. Few if any of the dental schools in the United States are without instruction in surgery. Formerly in this country, with one or two exceptions, no dental schools other than those connected with medical colleges gave systematic training in surgery.

By many dentists it is still thought to be a waste of time which could be better employed in the so-called practical branches. This idea is very thoroughly imbibed by a large part of the student body, and not until it has been demonstrated that surgery is as much a part of dentistry as is the filling of teeth will the student become interested in it. It is perplexing to understand the older practitioner who belittles the teaching of surgery in dental schools while he is daily doing minor surgical operations which, had he the training now given students of dentistry, he could do much better. In addition to this he could extend his usefulness by performing more important operations which now from a lack of broader training he must refer to someone better equipped than himself. It would seem unnecessary to present argument to establish the fact that a knowledge of general pathology and surgery is as needful (perhaps in a somewhat narrower scope) to the practitioner of dentistry as are those subjects to the practitioner of medicine; but if he is to be a thorough, all-around dentist he must in this age know them.

It is true, as often cited, that but few dentists expect to become oral surgeons in the broadest sense. It is equally true that all dentists do not expect to become specialists in orthodontia, but no school could be regarded as doing its duty did it not train its students in the correction of irregularities of the teeth. If dentistry is to maintain itself as a learned profession it must lay a broad foundation of the fundamentals, sufficiently firm to carry a superstructure which will qualify its graduates to practice their calling in the widest possible manner. There are many vexatious questions in dentistry yet unsolved which must be relegated to general medicine for a solution unless we know more of pathology, more of bacteriology, and more of other fundamentals of medicine. A lack of

knowledge of these branches of surgery may jeopardize our patients' welfare. The preparation of cavities, the construction of artificial teeth, and the building of bridges could, it is true, be accomplished with a mechanical and artistic knowledge alone; but this knowledge is only a part of dentistry, and besides, most of this work is closely related to or may be the cause of pathological processes from which it cannot be separated in all cases.

From clinical experiences all practitioners know the serious train of pathologic conditions which at times follow the filling of teeth or the insertion of bridges and artificial dentures. A resultant condition may be no more serious or far-reaching than an alveolar abscess, but we sometimes find as a sequence of an alveolar abscess, necrosis involving the whole or part of the mandible, or caries of the maxilla, or empyema of the maxillary sinus, or occasionally a general pyemia. These conditions and many others are familiar to you.

A knowledge of therapeutics and its practical application, and a knowledge of surgical pathology and surgical technique, may and often does prevent the serious complications above mentioned, while giving strength and confidence to the dentist when confronted by such conditions. It may be true that the dentist does not necessarily need such broad knowledge of general pathology as the practitioner of medicine, but he should have a widely diversified knowledge of it in order that he may be equal to an emergency should it arise.

The knowledge which the dentist must possess and which is not necessary to the general practitioner, adds enough to the dentist's college work to make his course equal in extent to the curriculum of most medical schools. If the dentist be wise and serve his patients to the best possible advantage, he will not utilize his knowledge to the extent only of making a careful examination of the teeth to discover disease in them and the immediate adjacent tissue, but will go over the entire oral cavity, and if he have sufficient knowledge of surgical pathology he may by early diagnosis ofttimes save the patient much suffering and perhaps his life.

The tongue, the salivary ducts, the mucous membrane, and every part of the mouth should be as frequently and thoroughly examined as the teeth. It is well known that many benign growths in the mouth if neglected often assume malignancy, which by early attention may be prevented; hence the importance of careful and frequent examination of the dentist's field. Many patients do not know of the danger, and in fact may not be cognizant of the condition until their attention is called to it by the resultant inconvenience, at which time it may be too late to effect a remedy.

Surgery may be defined as a mechanical performance intended to relieve the body of a pathologic condition or injury, hence if the dentist be well versed in pathology and bacteriology and in the fundamentals of general medicine, he is by virtue of his mechanical training well equipped to practice surgery. The technique which he has acquired in operative dentistry qualifies him in a high degree to perform surgical operations in the mouth. Very few surgeons have the manual dexterity to fit them for delicate operations in the mouth, and a great number of those who have do not contemplate with pleasure oral surgical operations, and it is quite certain that all operations in the mouth would soon be relegated to the dentist did the surgeon have confidence that such operations would be as well done by him as are operations on the nose by the rhinologist, or as are operations on the eye by the ophthalmologist.

At this point the question arises, To what extent may the degree "Doctor of Dental Surgery" legally qualify one to practice oral surgery and not render the dentist liable under the medical practice act? Some are of the opinion that no one is under the law qualified to practice surgery who does not possess a medical degree. No case, so far as the writer is aware, has been passed upon which gives an answer to the question, and until a ruling be rendered no definite answer can be given. However, it would seem that

since dentistry has a standing before the law as a profession—there being statutes governing its practice—a decision regarding this matter must be reached through an examination of the curriculum of the dental schools, as surgery is as much a part of the dental curriculum as is operative dentistry. Dentists, then, may perform legally any surgical operations which are taught in the dental schools. Certainly the law would demand that anatomy, physiology, chemistry, histology, general pathology, surgical bacteriology, and materia medica, in addition to surgical technique, be comprised in the curriculum leading to surgical training, since these branches all combined comprise surgery. If under the law the dentist may practice surgery, what then is his legitimate field? With the three-year course surgical work in dental schools has necessarily been abridged. The heads of other departments in the schools are sure that more time is necessary for the presentation of their particular subjects — a contention which is granted; therefore the time remaining for surgery is inadequate for a thorough presentation of the subject. The field would seem to cover the mouth, face, and jaws, and extend as much farther as the pathologic conditions originating in this field may have developed; however, it would be wise for the dentist to call other specialists to his assistance in instances where the conditions carry him into parts which are the legitimate field of the ophthalmologist, rhinologist, etc.

I am of the opinion that the entire course of surgery should not be concentrated, as is the custom in this country, into the senior year; the subject is too comprehensive. The principles of surgery as well as a part of surgical technique should be taught in the junior year, leaving clinical and operative surgery mainly for the senior year. Together with the principles of surgery, a course on the cadaver is very desirable, as it not only keeps the student's mind familiar with anatomy, but increases his interest in surgery, for unless interest in the subject is stimulated he feels that it is not one of the important parts of dentistry and consequently never acquires a full knowledge of it.

To be more specific, the junior year should include surgical bacteriology in its relation to inflammation, sepsis, asepsis, and antisepsis, and the treatment of inflammation. It should also include wounds, the healing of wounds with regeneration of tissues, instrumentation, suturing and suture materials, and the applications of dressings, and bandaging. On the cadaver should be taught ligation of bloodvessels, tracheotomy, resection of the jaws and nerves, also Gasserian ganglion operations. This course would bring the student to his senior year fully equipped to comprehend and enjoy a course in clinical and operative surgery. To accomplish this work will require two lectures a week throughout the course. In the senior year not less than one lecture and one clinic a week is necessary to properly bring the remaining portion of the subject before the student. The following subjects should be covered by lectures and exemplified in clinic during the senior year, the order to be, viz: Extraction of teeth, including impacted teeth; fractures of the bones of the face and jaws; dislocations; ankylosis of the jaws; resection of the roots of teeth for the cure of persistent alveolar abscess; implantation, replantation, and transplantation of teeth; surgical treatment of alveolar abscess, caries, and necrosis of bone; diseases of the maxillary sinus; aneurisms; resection of the jaws; resection of the branches of the fifth nerve; Gasserian ganglion operations; surgical diseases of the tongue and mucous membrane of the mouth, with diseases of the lips; surgical treatment of actinomycosis, cleft palate, and hare-lip operations; tumors and cysts of the mouth and jaws. I arrange the course in the foregoing order, placing extraction of teeth and removal of impacted teeth first because it is desirable that the student may have an opportunity early in his senior year to gain practical experience in the infirmary, so that by the close of the term he will be better qualified to perform this work in his practice. Concurrently with this course, and commencing with it, the

administering of anesthetics should be exemplified on animals and on human subjects in the clinic.

The clinic should be held preferably in a well-equipped hospital; certainly at least a part of the course must be held in such a place, both for the safety of the patient in cases which require confinement in bed for several days after the operation, and for the benefit of the student. However, for the majority of cases a well-equipped surgical infirmary will suffice. This infirmary should be used for no other purpose whatsoever, and be kept scrupulously clean. It should be equipped with all modern surgical appliances needful for our work, including appliances for aseptic work, such as sterilizing apparatus, etc., for the benefit of the patient and to demonstrate aseptic surgery. At these clinics there should be present at least one surgical assistant, an anesthetizer, and one or more surgical nurses. In addition to these as many students should be drawn from the class each week as can be accommodated, in order that they be given a closer observation of the procedures. All of these assistants and students should be "scrubbed up" and gowned in sterilized gowns, no matter how trivial the operation. These precautions should be observed even in the most minor cases, for the moral effect if for no other. In connection with this infirmary there should be a recovery room, with suitable beds, etc., where patients may remain until in a safe condition to depart. Students who have watched the operations should have patients consigned to them for future treatment under proper supervision, should treatment be necessary.

Printed examination blanks should be filled in by the student under the supervision of the chief assistant to the surgeon, giving a history of the result of the case, with examination and diagnosis. The surgeon then makes his examination and corroborates or corrects the former diagnosis and performs the operation, the patient having been previously prepared. At subsequent clinics the patient should be exhibited to the class. When a student has had a patient from the beginning, witnessed the surgeon's examination and the operation, and has taken the patient through the subsequent treatment, he is in a measure qualified to take charge of similar cases in practice.

I would urge that greater time be devoted to minor surgical operations such as the dentist may encounter every day in his practice, and less time be devoted to the more serious operations such as the Gasserian operations, cleft palate, and hare-lip—operations which must as a rule go to the specialist in oral surgery or to the general surgeon.

A technical course in the manufacture of splints and other appliances for the treatment of fractures of the jaws should be given to more fully equip the student in this work.

At no time in the surgical course should the student be permitted to believe that he is being taught anything but dentistry. He should have it inculcated in him that each chair is teaching him dentistry pure and simple, and that none of the subjects can be omitted and he become a well-rounded practitioner. He should be made to feel that his standing may be established or seriously injured at the outset of his professional career by ability or inability to properly care for a fractured jaw, diagnose and treat a case of empyema of the maxillary sinus, or differentiate between caries and necrosed bone.

In conclusion I would suggest that when practicable, the teaching of oral surgery should be done by one who has had experience in the practice of dentistry and who also has a medical education, as this combination better fits him for the work of teaching the subject. The general surgeon may be well qualified to teach the principles of surgery and the more serious operations before referred to, but from lack of experience in the dentist's field he cannot be as efficient a teacher as one having knowledge of the special pathology of the teeth and jaws and the technique which is gained by constant oral operating.

Discussion.

Dr. N. S. Hoff, Ann Arbor, Mich. The only point upon which I might pos-

sibly differ with the essayist is as to whether the man who teaches oral surgery should be a medical man or a dentally educated man, and I do not intend to differ seriously with him on that point, as something can be said upon each side of that question.

I once asked a surgeon who was eminently successful with his work, to what he attributed his success. He answered, "I am a good physician." He was not known as a brilliant operator, but his answer gave me the clue at once to the reason for the success of his work. He knew how to take care of his patients after he had operated upon them. He knew how to diagnose his cases in the first instance. He may not have been as dextrous in manipulative skill as some others, but he knew how to perform his operations, and afterward to exercise care commensurate with the gravity of the operation.

To illustrate my remarks practically, I want to relate the conditions under which we are operating in our school, and thus convey to you some suggestion of what my ideas are in relation to this subject.

Our oral surgeon is a medical man, not a dentist at all. He is a man who is very much interested, however, in our work and has informed himself upon everything that our literature contains in reference to the practice of oral surgery from a dental standpoint. He, however, lacks the technical training of the dental man, and does not attempt to teach that portion of the subject.

We have recently organized our surgical department upon a new basis, with this medical man, who is an excellent surgeon in general practice, as the chief. He has as assistant a dental man who is also a full professor in the faculty and a man of good training for the work. He is known as the therapeutic man. The work is divided so that the dental aspect of the subject is treated entirely by the latter gentleman.

To more completely organize the department we have established a course in pathology, beginning of course with bacteriology and histology—the bacteriology and pathology from the laboratory standpoint being in the hands of another teacher—so that we have three teachers comprising the surgical faculty.

The course of study is given by lectures on oral surgery and the principles of general surgery by the medical man, and the practical oral surgery also further extended by the clinical demonstration. This is supplemented by a laboratory course on the cadaver given under the direction of the general surgeon, which has been given until now with the assistance of his associate who is a medical man; but this year the course will be given with the assistance of the dental man who has charge of our laboratory course in oral pathology.

We feel that in this way we are going to connect our medical man with our dental therapeutics, and his part of the work is also of the dento-surgical order; his work also includes operative procedures in connection with diseases of the pulp and their sequelæ, alveolar abscesses, and work of that sort, together with clinical demonstration of the administration of anesthetics, the extraction of teeth, and the ordinary dental surgical operations.

These three men being organized into what you might call one faculty, they work together, teaching the general surgical principles of pathology and therapeutics and the general treatment of the subject largely from the dental standpoint. The operation which falls to the dental man he looks after himself; the operation that falls to the general surgeon is looked after by him, and we hope in this way to get the benefit of the wider knowledge and experience of the general surgeon and also the wider knowledge and manipulative skill of the dental surgeon, and combine it by practical laboratory work.

This, in brief, gives my idea of what may be done to organize a course on what you may call a high, practical basis.

I concede it would be very desirable if it were possible for us to have a dental man medically educated—that is, equipped with medical knowledge, not

merely a medical degree. I do not think that the mere possession of a medical degree necessarily fits a man for doing this work. A degree might mean little or nothing, but I feel that the practice or technique of the medical man who has given his attention to general and regional surgery is very much more valuable, especially if he be in active medical practice, as he will understand the treatment and handling of surgical cases not only from an operative standpoint but from a medical one as well. I do not believe that the dental man who has practiced dentistry exclusively can have the same command of the situation that the medical man has. Whether it is possible to make these men work in such close touch and in such harmony as to constitute one grand oral surgeon remains to be seen. It is an experiment we are trying, and we hope it is going to succeed, and believe that it will, because these three men are very warm friends and work agreeably together. Each man has his work outlined, and each has agreed to work into the hands of the other. We hope by this process to make a composite oral surgeon, if you please.

In most of the dental schools this work is entirely in the hands of medical men; that is unfortunate, because, as a rule, the medical man does not grasp the subject from the dental standpoint, and that is the point we are more interested in developing.

I was very much interested in the idea expressed in the paper that in teaching this subject we must not forget the ordinary surgical operations, for every lesion about the mouth which is associated with pathogenic conditions involves an operative procedure. I think it is absolutely necessary that if one man is entrusted with the teaching of this subject that man should be a dentist. But where a faculty can be organized in the manner in which we are trying to organize at Ann Arbor, I do not see any reason why we should not make use of the broader skill and experience of our medical *confrères.*

Dr. JOHN S. MARSHALL, San Francisco, Cal. I heartily concur in the position taken by Dr. Gilmer and with his recommendation as to teaching oral surgery. I would, however, go a step farther than he does. I have always felt, ever since I have been a teacher of oral surgery, that not one-third of the time is given to the teaching of this subject that its importance demands. I have pleaded with the faculties with which I have been connected for more time in which to teach oral surgery, and I have frequently said that no class of students receiving but one lecture a week during the term could comprehend the subject or understand the value of a good knowledge of oral surgery. They can get in that length of time but a very imperfect idea of the technique even of operations, and I have always felt greatly handicapped in my work on this account. If I could have had three lectures and one clinic a week in teaching oral surgery I think I could have done something. The importance of this branch is not appreciated either by our faculties generally or by the profession at large. When we take into consideration the fact that the dental surgeon has the earliest opportunity to see the various oral lesions, and especially those which are malignant in their tendencies, at a time when an operation would be of the greatest benefit, it is greatly to be deplored that so few dentists understand the pathology of these lesions sufficiently well to be able to diagnose them correctly. As a result our patients frequently suffer the gravest consequences, even to the loss of life in some cases.

You know Garretson says in his "Oral Surgery" that he believes in classifying as malignant all forms of tumors of the mouth which he cannot diagnose as being positively benign; and that, gentlemen, is the only safe way to handle any of these lesions or neoplasms of the mouth. I believe I succeeded better in my work in Chicago on that line of practice than any other. I have frequently removed growths which other men said were benign and might not do any harm, appreciating that the tendency of all benign growths in the oral cavity is toward malignancy. The dental surgeon often

makes the mistake of trying to remove those conditions by using caustic and remedies of that kind which only set fire to the tinder, so to speak, thus hastening the malignant aspect of the growth, when if he had realized this tendency at once and recommended the knife he might have saved the life of the patient.

I have been hoping for a good many years that the faculties of our dental schools would take cognizance of the fact that oral surgery is an exceedingly important part of our dental teaching, and I believe that when the time comes that our schools begin to teach oral surgery as it should be taught, the general surgeons will be only too glad to turn over all that class of work into our hands. I have frequently heard some of our best surgeons say that if they had confidence in the ability of dental practitioners to handle these cases they would gladly turn the cases over to them. Surgeons deplore their lack of manipulative ability in the mouth, and say that the dentist can do more in a minute in an operation about the mouth than the average surgeon can in half an hour, because of the superior manipulative ability of the dental practitioner. In dental practice we are using delicate instruments all the time, and get to be very expert with the fingers. You perhaps have noticed the general surgeon at work in the mouth, and how clumsy he seems to be about it. Does not even know how to get his fingers in the mouth so as to expand the cheek and secure space sufficient to be able to see what he is doing. The dentist becomes expert in oral manipulation, and if he has the training from a surgical standpoint to enable him to do that sort of work he can far exceed the skill of the general surgeon in this department of operative surgery.

I greatly hope that the time will come when all of this work will be relegated to the dentist, to whom it belongs.

Dr. W. J. Roe, Philadelphia, Pa. The question is frequently asked: What is the province of the dentist in relation to oral surgery? It is difficult to give a clear, decisive answer to that question, but—as Dr. Gilmer has so well said—I believe it is proper to frequently impress upon the members of the class that we are teaching them dental surgery, and not trying to make oral surgeons or specialists in oral surgery out of them: that the knowledge we seek to impart is for the purpose of making them able to recognize and relieve all lesions of the oral cavity, whether from traumatism or as the result of pathogenic processes—to recognize these conditions in their incipiency, because we know that the patient goes to the dentist first in such cases, and frequently has been under the care or observation of the dentist for months (without receiving any proper suggestions with regard to the course of procedure and treatment) before the true nature of the condition is recognized.

It is along that line that we should emphasize the province of the dentist. The dentist should be as familiar with oral lesions—their etiology, symptoms, and diagnosis, and the proper treatment —as is the general surgeon or the surgical specialist with those appertaining to his department. When the patient presents himself with a lesion of the mouth, no matter whether from accidental causes or from disease, the dentist should be able to recognize it and warn the patient of the necessity of treatment and also to outline briefly the proper course to be followed. It is not a question of whether there is any great necessity for operation upon the Gasserian ganglion or of other technique of procedure in the graver operations, but there are other operations which are imperative, and which under conditions of emergency the dentist might be called upon to perform, such as a ligation or tracheotomy.

Dr. Rudolph Weiser, Vienna, Austria (honorary chairman of the section). In many respects you are working in the right direction. Before I began the study of dentistry I first received training as a general surgeon, and I am convinced that in order to perfect the general surgeon in manipulative ability it would be well to begin to exercise the hand in dental practice preliminary to taking the course in general surgery;

and this is especially true with reference to operations in the oral cavity.

The course in the dental colleges should be extended so that the student may have ample time for a training on broad lines—just as the Commission on Dental Education of the Fédération Dentaire Internationale has declared that it will be necessary to extend this course to four years. I believe this will be a sufficient time in which to prepare students for dental work and fit them for oral surgery. I repeat that I have often thought I would have become a much better surgeon had I first had an opportunity to practice dentistry previous to my surgical course.

Dr. G. V. Black, Chicago, Ill. I regard this subject as one of very high importance and very closely connected with our work, because in the general order of things the dentist first sees these pathologic conditions in the mouth; the sufferer first comes to the dentist, and the dentist should be able to recognize the conditions at sight.

On the other hand I do not suppose that we will ever be able to make successful oral surgeons of all dental students, and it will be only the men who specialize that will become what may be properly termed oral surgeons. In order to obtain this result, dental education as is now given should be supplemented by such a course as is required for the M.D. degree.

I care not about the *degree,* it is the *knowledge* that forms the basis of the degree that is the important thing. The dentist may perfect himself in oral surgery without possessing the degree of M.D., and he will be recognized at once. There is no difficulty on the score of recognition.

The most important point, it seems to me, that has been partially brought out here, is that students shall have such a course as will enable them to recognize or diagnose all lesions in the oral cavity. One of my students came to me and said he had found a case of hypertrophy; there was a small, tender area under a plate that a patient had been wearing four years and my student wanted to know what to do with it. I looked at the case; it required only a glance to know what it was. I said, "Take the probe and go into that sore and see what you find; go into it thoroughly." He thought it was a neoplasm. He afterward came to me with an impacted canine which he had found under the swelling.

Now, these young men should have such a course as will enable them to recognize such lesions. This is more important than the acquirement of manipulative ability to operate; for, as a general thing, if a man becomes able to recognize the character of disease he can learn the proper method of procedure. What we wish today is to store the minds of our young men with such knowledge that patients may be safe in their hands.

Dr. Arthur D. Black, Chicago, Ill. There is just one feature of the paper regarding which I would like to speak. Dr. Gilmer referred to the fact of the desirability of the technical course in connection with the teaching of oral surgery. I would call attention to the manner in which such a course is carried out in our school under his direction, particularly in connection with the treatment of fractures. We have taken a number of plaster casts which were made by the students in their prosthetic work, sawed them apart and reconstructed them in such positions as they might be found in cases of fracture; then Babbitt metal models have been made of both the upper and lower dentures and mounted on occluding frames. These Babbitt metal models of the jaws in the displaced positions are given to the students in a number of different forms, as illustrative of different fractures, and the students are required to take impressions and make plastic models, reconstructing them in proper occlusion, and then make splints for them in the laboratory. This is such a case [indicating model] made by one of our students. They are also required, on other Babbitt metal dies mounted in proper occlusion, to drill holes through the interproximal spaces and wire the upper and lower teeth as they would be

wired in the treatment of fracture cases, and when a student has a case of fracture placed under his care in the clinic he is required to make plaster models of such a case. If it is a case where he wires the teeth, the casts are made and those teeth are wired on the model in exactly the same position as they are wired on the teeth for the patient.

Thus, even before students have an opportunity to handle cases in the clinic or in actual practice, they are enabled to acquire a good technical knowledge of the treatment of fracture cases, and when a student has handled two or three of these model cases in school work he is certainly much better equipped to handle similar cases when they come to him in his practice later on.

A question has been raised in this discussion as to whether a man with an M.D. degree, or with a D.D.S. degree, or with both degrees is the best man to teach oral surgery. It might be interesting to know in this connection that twenty-six of the men who are teaching oral surgery in the dental schools of this country are M.D.'s, while fifteen have both the M.D. and D.D.S. degrees, and four have the D.D.S. degree only.

Dr. Weiser. I desire to take the liberty of adding a word or two on this subject which the cases here presented bring to my mind. They remind me of a case which I had just before coming over to America. A man had sustained a fracture of the mandible and also of the maxilla, which was broken into two fragments. He was treated immediately after the accident by a very excellent surgeon, but with indifferent success. In fact, this case of fracture was something lying between the fields of surgery and dentistry; it was too unimportant for the surgeon and too surgical for the dentist. The condition in which I found the mouth of the patient when presented to me was deplorable. I found that the first thing to do was to bring that mouth into a hygienic condition. Innumerable splinters of asphalt pavement had to be removed from beneath the mucous membrane of the lower part of the vestibulum oris, and after taking an impression of the upper and lower jaws I was able to treat the case properly by replanting the lost upper right central incisor with the anterior plate of its alveolus by means of silver caps which did not at all interfere with the occlusion.

Such cases remind me of my belief that it is impossible to bring men to study medicine four, five, or six years and then take a three-years' course in dentistry. That would be too difficult to accomplish, but it would be possible to arrange for a fundamental course of perhaps three or four years in the general subjects common to both medicine and dentistry, which would enable one to become a specialist either in dentistry or in surgery. And if a man educated in this way wishes first to become a dentist he would have the foundation to make of himself also a good practitioner of oral surgery.

On the other hand one must remember that general medical and special surgical studies must necessarily be included in the curriculum of the oral surgeon.

Dr. Vida A. Latham, Chicago, Ill. We do not expect the dental student to be a dental surgeon unless he has the elementary training in pathology and its allied branches. Can a dentist recognize an hypertrophied condition in the mouth unless he knows the general structure of the tissues in the mouth and their relations in the oral cavity? Take the surgical part of the work; I believe that he should have a basis for that. The best way, in my opinion, is to teach him dental histology and pathology, so that he thoroughly understands tooth-structure and the soft parts of the oral cavity.

In this course I believe we need to be made more familiar with all parts of the human body, but we should have a special dental histology and pathology course taught by those competent to give a more thoroughly equipped one than we are having at present and by one who knows our practical needs.

The study of neoplasms and other pathologic conditions should be well brought out; then turn the attention of the student in the direction of surgical,

pathological, and clinical work and let him study the general principles. Let him take a piece of silk floss, or wire, or catgut and teach him to form sutures, and to tie the different varieties, and when to use them. See that he has a knowledge of the different uses of catgut and silver wire, and when his fingers have become skilful he may take up some work upon the lower animals; then let him assist in surgical clinical work and afterward act as assistant to a surgeon. Most of the boys attending our schools do not care about histo-pathologic work, and the unfortunate circumstance about it is that they are not encouraged or called on to do enough work—and that has been a very common failing in the dental colleges, as students are given too much mechanical instruction in the course, to the detriment of a scientific training.

Let us resort to our pathology, so that our manipulation of an alveolar abscess will begin at the moment of the appearance of the infection in the mouth. I have emphasized that repeatedly. I have had occasion many times to illustrate these conditions to my patients in order to get them to seek relief from the condition present.

Our oral surgery text-books—where are they? Our dental text-books—where are they? We have nothing but a rehash from morning until night. The books written for us today are not scientifically correct on the subject of dental pathology. When, a short time ago, I looked up in Wedl, Bödecker, and Römer the subject of neoplasms of the tooth-pulp I found them classed as tumors of the pulp, while they are really polypi, hypertrophies, or myxomas. Our terminology is very faulty. If you speak of a tumor of the mouth, let it be a tumor in the correct sense of a neoplasm—pathologically so meant—and not an abscess or a swelling of some sort. If you say tumor of the mouth, as a sarcoma, or epithelioma, or carcinoma, follow it up by its terminology and then the student will know what he is looking for and what he is working on.

As long as we get a lax kind of service from our oral pathologists anything is good enough for dentistry. I think our dental college work should be purely medical for the first two years, and dental work and purely practical work in lines of both medical and dental practice for the remainder of the course. We say we have nothing to do in our fourth year—or third year. Let those who have that conception study oral chemistry, bacteriology, anatomy, pathology, and surgery, then ask a man to get up an original thesis; we would then have better-trained men.

Dr. A. Hamilton Levings, Milwaukee, Wis. The difficulty of teaching oral surgery to dental students in my own classes I have found lies in the fact that the dental student in our school is not required to give the same time to anatomy, histology, and pathology as is the medical student. In place of those studies they are given technique, which I believe occupies nineteen hours per week, so that the students begin to think their work is largely mechanical. When you attempt to teach these students oral surgery based upon anatomy, histology, and pathology, you have to go into the rudiments or they do not understand.

I was very much interested in Dr. Gilmer's paper, but it seems to me that he goes too far. In fact, a man who practices dentistry—a man who works at the chair and intends to make his living by operative work—never can perform successfully the major operations which the essayist mentions. He never will have the technique; never will have the experience; never will have the moral or physical courage to operate upon the Gasserian ganglion, to perform tracheotomy, to attack the branches of the fifth nerve, or the major vessels supplying the face or the mouth.

The operations are difficult and require constant practice in surgery. I do not try to impress upon my students the technique of the resection of the jaw, or the operations for the removal of the Gasserian ganglion, or the resection of the tongue, but I try to instill into their minds the etiology and pathology of the conditions which we find. Now we all

know that the majority of patients with pathological processes in the mouth and jaws come primarily to the dentist, and it is the dentist who should be able to recognize the importance of the condition; then if he cannot or is not disposed to treat it he can direct the patient to someone who will. The first recognition or diagnosis of these processes should come from the dentist, because he is the man who will first see them. It seems to me that the teaching of dental surgery today should be along this line. Students should be taught the pathology and symptomatology of these processes, and when you have done that, as Dr. Black has said, you have practically completed the subject.

Dr. T. E. Carmody, Denver, Col. I would like to go back a little farther than some of the gentlemen have, and say that our students are made to take up the study of pathology before becoming reasonably familiar with normal physiology, and, as one of our prominent physiologists says, "pathology is simply physiology gone astray." To know well physiology and pathology, and to be able to diagnose their cases correctly, equips them for the practice of dental surgery and enables the dental practitioner to become a successful oral surgeon provided he have the other qualities requisite to the practice of that department of our work. Every physician does not succeed in surgery, neither should every dentist try to be an oral surgeon. I think if we teach the main diagnostic points, those who wish to follow the subject farther can take the extended study later.

The Chairman. I would like to tell you briefly, how we at the University of Iowa hope to meet the questions that have been raised today. In the teaching of oral surgery, I have found, as you all have, that no matter how you arrange these considerations in your mind, you are dealing with two distinct and very practical questions. Where shall the line of demarkation be drawn between operations that should be performed by the dentist, and those which should be exclusively the work of the surgeon?

For the last year or two I have given clinics at the hospital where we perform all the major operations; and operations of that character can only be done properly and safely in a hospital surrounded by the conditions which prevail there. Moreover the peculiar elements which are impressed upon students through witnessing the procedures of the operator and his assistants in hospital work are in the highest degree beneficial.

We found that this practice was giving the students a one-sided and disconnected sort of education, because they received purely dental instruction on the one hand and surgical hospital instruction on the other; there was an interval between the two that was not filled. To overcome this we have fitted up a room at the college equipped in every way as a hospital would be, having also facilities for the care of the patients after operations, so that patients can come to the college and have minor operations performed in a proper place by students under our direction, and we hope by this means the student will be properly trained to do those things that he ought to do, and still not become narrow.

Dr. Gilmer (closing the discussion). I am obliged to those of you who have so kindly discussed my paper. Of course the paper generalized a good deal, but when you read it I think you will find that it has covered pretty much the ground in which you have specialized.

I am very much obliged to Dr. Arthur Black, who so kindly gave me credit for the course in the treatment of fractures; but really the credit belongs to him, because he suggested it to me and has carried out the idea in conjunction with my work.

Adjourned until 2.30 p.m. Wednesday, August 31st.

Second Day—Wednesday, August 31.

The section was called to order promptly at 2.30 p.m., Dr. George V. I. Brown being in the chair. Honorary Chairman Dr. Rudolph Weiser of

Vienna, Austria, was called upon to preside, and Dr. Brown (the chairman) read his address, which was illustrated by a large number of lantern slides.

Chairman's Address.

"In my Father's house are many mansions." Likewise upon earth, in the house of our mother "Medicine" there are also many mansions, and to one of these, the one we all recognize with pride as the home of our own upbuilding, a structure reared by the patient self-sacrifice of loyal dentists who laid its foundation within the shadow of the walls of older medical institutions in the still recent past and from whom the work of its continuance has come down to us as a sacred trust in the fulfilment of which we have gathered here today from the far corners of the earth, to be united under the roof-tree of our own special science—to lay each of us upon its altar the dearest treasure of his latest thought, and in the common spirit that animates us all, for the time lifting beyond the limitations of speech in language other than our own, to establish new records for the guidance of our *confrères* in the relief of human suffering. It is thus my great privilege, as chairman, to give you welcome to the Section of Oral Surgery.

We know Garretson must be in our midst today, and that round about him stand other noble men who have stepped aside from the duties of the dental and general surgeon to contribute something useful toward the development of the science of oral surgery; yet, much as we might incline to eulogize and to dwell upon the individual benefits conferred, it is not so much with these as with the legacy they have left us that we are for the moment concerned.

It would seem to be my duty also, as your chairman, to call attention briefly to those most important considerations which, being of vital interest to the special surgical field we represent, should receive at this time your best attention—that the Fourth International Dental Congress may by the consensus of opinion here expressed establish and define a position for future guidance.

With this in view, my subject naturally divides itself into three heads:

First, The relation of oral surgery to general medicine. Second, The line of demarkation between those operations that properly belong to the oral surgeon and those outside of the field of his best usefulness. Third, The most urgent need of advancing both the standing and the usefulness of this work, by definite diagnostic systems.

Inheritors and partakers of the priceless gifts conferred by Priestley, the discoverer of oxygen, John Hunter, the anatomist, Harvey, the physiologist—discoverer of the circulation of the blood, Simpson, the discoverer of chloroform, Pasteur, father of bacteriology, and Virchow, of pathology, all of whom, with a legion of others, are almost as much akin to us as Wells, the dentist, discoverer of nitrous oxid, know that oral surgery is in no respect different from any other branch of medical or surgical practice, except with regard to the special field of operation and nature of certain operative procedures, and is therefore a branch of the parent medical tree.

Like ophthalmology, otology, gynecology, orthopedics, or other generally recognized special divisions of practice, oral surgery has its own characteristic features, yet, in common with them, depends for its basal principles upon pathology, therapeutics, and surgical methods gleaned from the broad teachings of medical science.

In order that each division of the subjects prepared for the program might have presentation from the highest and best source obtainable, practitioners of dentistry and medicine have been invited to contribute, without any line of distinction; and indeed, no such line could be recognized without seriously crippling the scientific value of the section.

We find two distinct classes of practitioners sometimes arrogating to themselves the title of oral surgeon: the one, for want of surgical training, confining his operative efforts to minor surgical operations quite within the province of

the daily practitioner of dentistry; the other, with broad knowledge of general surgery but little or no dental training, performing major operations skilfully, but many other operations—perhaps of less degree, though no less important—either not at all or very imperfectly at best.

One attempting to limit his practice to oral surgery finds the scope and nature of his work but little understood in professional ranks, and naturally much less among the laity. Further, he is more or less in danger of undertaking too much, and therefore laying himself open to criticism on the ground that he can rightfully claim no special fitness for operations too far removed from his own anatomical division, or of doing too little, and thus meriting respect from neither dental nor general surgeons.

A study of the text-books on oral surgery will prove them—with a few notable exceptions—to be divided into these two classes, and the teacher of oral surgery often finds himself sorely puzzled to know just how extensive to make his course.

Having for several years past devoted myself entirely to practice limited to diseases and deformities of mouth, face, and jaws, the only practitioner so far as I have been able to learn who does this exclusively, my practice made up almost entirely of patients referred by practitioners of general medicine, dentistry, or some one of the other special medical branches of practice, I trust to be able to outline from practical experience the several classes of operations that are most readily recognized as being in line with the fitness of one undertaking the work—and to explain why this is so.

It is hoped that the published results of this meeting will give to the world a new conception of the wonderful progress and the surgical possibilities of our special field, and the aim in preparation of the program has been to bring out by practical representation the results in each of the chief divisions, in order that a full and creditable showing may be made in the published Transactions which must be our record until the next International Dental Congress.

To this end, and further to emphasize the need of more carefully established rules for diagnostic guidance, I have chosen to illustrate a number of cases from my practice and to give both ante-operative conditions and post-operative results, some of these being of special interest because of similarity of objective symptoms—while the etiologic factors are, as a matter of fact, entirely different.

Case I. The first case is that of a young married woman who during confinement and for a period of several months before and after was obliged to lie in bed, during which time the pus from some diseased roots and bone in the lower jaw—facilitated by gravity in the unusual recumbent position—had formed between the fascia and muscles of the neck in large quantity, finding exit through a fistulous opening just above the clavicle, and extended upward along the superior maxillary bone to make its way out through fistulæ at the external angle of the eye and the malar bone on the affected side, so that irrigation through the sinus at the clavicle forced pus and fluid out at the corner of the eye or malar bone, and *vice versa.*

The general as well as local condition of such a patient might naturally be expected to be bad, and as a matter of fact the toxic influence of such long-continued and profuse pus formation upon the general system was marked by anemia (or dysemia, to use a newer term) with general weakness, yet upon the removal of the exciting cause, and continuing proper treatment, complete recovery followed—a result quite different, as may be noted, from other cases herein described which were outwardly less serious but in which fatal results ensued despite every possible care.

Case II. A young man, age about twenty-two; so far as could be learned of good general health until some two weeks before being referred to me, during which time he had been under the care of his physician. Face on right side badly swollen, temperature 104°,

pulse 120. Examination disclosed the fact that inflammation had begun in the gum tissue upon the buccal and distal sides of the lower third molar, from which region there was a dark, ink-like discharge but no appearance of pus. It was necessary to use a mouth-gag in order to open the jaws sufficiently for treatment. Notwithstanding prompt local and general care the inflamed area extended until finally an opening was formed through the cheek, and noma in typical form developed. Black masses of tissue formed so rapidly that five or six dressings with powerful antiseptic agents daily, and moist antiseptic applications almost constantly, failed to check the destructive progress of the condition. Pulse rate and temperature ranged as high as 136 and 105 respectively. Mental faculties remained undisturbed until about the eighth or ninth day, when slight wandering was noticed. About the twelfth day expectoration of black gangrenous masses and red blood showed that the affection had extended to the lungs, and death shortly resulted.

During this period the best of hospital care was given and every effort made to combat the disease locally as well as to support the system generally, but with no apparent benefit, and yet bacteriological examination showed staphylococcus infection, not streptococcus as was expected.

Case III. A man, age forty-five, high-class mechanic, married, large family of healthy children and no history of specific disease. General health good until within a few months of the time real trouble began, when he left work and called his physician, in whose charge he had been during a period of about two weeks until referred to me. Mouth and teeth were coated and very foul, lingual surfaces of the roots of the anterior upper teeth very slightly denuded, as from pyorrhea pockets, and sloughing of gingival margins in that region was noticeable. Anemic appearance was marked. Blood counts taken at different stages of the disease were as shown in the accompanying table:

Blood analysis in Case III.

Name.	Normal.	Condition present.
Red corpuscles	5,000,000	1,704,640 15,000,000 Aug. 10th
Hemoglobin	100 per cent.	45 per cent. 30 " "
Corpuscle index	1 " "	1.3 " "
White cells	7,000	93,100 105,000 Aug. 10th
Polymorphonuclear-neutrophiles	70 per cent.	8 per cent.
Small lymphocytes	8 " "	26 " "
Large lymphocytes	20 " "	60 " "
Remnants of leucocytes	¼ of 1 " "	6 " "
Megaloblasts	none	1 to each 100 leucocytes
Normoblasts	none	1 to each 100 leucocytes

Sloughing extended to center of hard palate and an effort was made to remove the diseased tissue. The patient was anesthetized and the roof of the mouth was almost entirely removed. In all directions the bone seemed to be dead and of a gray greenish color, but nowhere could any tendency be found to the formation of a sequestrum. The same gangrenous condition as noted in the previous case continued until death resulted in about ten days.

Much is often said of the widespread influence and character of oral diseases, but it is not often that such striking examples are found as shown by the microscopic sections of the different organs of this man's body.

In the microscopical examination of tissue removed from mucosa covering the hard palate at border of necrotic area.

one-half of the section showed thickening and proliferation of the epithelial covering. Immediately beneath the epithelium were formed marked round cells, and leucocytic infiltration was in evidence, also here and there areas of karyhexis. Adjoining the inflammatory area is the necrotic zone. Here the epithelium was entirely removed, the tissue being represented by broken-down nuclei, leucocytes, and amorphous débris.

Case IV. Exemplifies by history and appearance the disastrous and hopelessly fatal results that follow neglect of an originally benign disease of the maxillary sinus—its final progress, the malignancy of sarcoma as indicated by the series of microscopic sections taken from the growth.

No. 1. Older portions of growth—spindle cells, or slow-growing in character.

No. 2. Newer with increase of round cells, a more rapidly destructive type.

No. 3. Pigmentation of melanin, the most destructive and malignant of all forms of this affection.

In the evolution of every science there is a period of expericism which holds almost undisputed sway. Conclusions are reached, statements made, advocates of one theory or another are roused into activity, each in turn to be displaced by the slower, sounder conclusions of scientific research.

No better example of this could be found than is evidenced by the progress of dental and oral surgery during the last decade, but on every hand today there is a growing intolerance of theoretical proposition unbacked by the weight of absolutely unimpeachable results in both clinical and laboratory tests.

More and more do we realize the breadth of study necessary to gather facts for the explanation of the phenomena that in the light of more superficial knowledge had seemed all-sufficient, and as we draw about us in closer alliance other sciences with which we have come to recognize a more intimate relation, and as with each step we near the true basic principles, it may be said that at last we are come into our own and have attained our majority in the world of science.

I trust that in the dignity of omnipotent majesty, Truth may preside over us, that charity and knowledge hand in hand may guide us forward in the direction of the greatest usefulness, and that the world may be the better for our having met.

Discussion.

Dr. T. L. Gilmer, Chicago, Ill. I did not hear anything in your remarks in regard to your treatment of these cases.

The Chairman. The paper was not upon any particular line of treatment. It was simply a chairman's address, which was cut off yesterday because our lantern played us false, and it was designed to call attention to the different classes of operations that we could perform better because of our dental training, and also to distinguish them from operations which we might not undertake for the reason that the general surgeon can treat them a great deal better inasmuch as they belong properly to his department. My address was also designed to bring out the point of necessity for better differential diagnosis.

It seems to me that our literature is weaker on the question of diagnosis than anything else; and for this reason I showed these cases—one that had the appearance of being very serious, but which was not really a grave condition, and one that did not at first cause apprehension but which terminated fatally. Yet an examination of the different organs of the body after death showed the same pathologic changes in the remote tissues that were present in the tissues of the mouth, thus indicating the hopelessness of undertaking to treat and cure any such condition locally.

We will now pass the paper and call upon John S. Marshall, M.D., of San Francisco, president of the Examining and Supervising Board of Dental Surgeons, U. S. Army, to read his paper entitled "The Treatment of Fractures of the Mandible." [Dr. Marshall's paper is printed at page 431 of the present issue of the Cosmos.]

Discussion.

Dr. D. F. Keefe, Providence, R. I. In my fifteen years' experience as attending surgeon to the Rhode Island Hospital there is one circumstance that has struck me very forcibly, and that is how few cases have to be treated surgically—that is, by wiring of the fragments. Unless there is considerable displacement, or in a case that occurs in a child too young to understand directions, it seems to me to be entirely unnecessary to resort to this method, which is objectionable chiefly on account of the resulting disfigurement. Then, too, in a majority of the cases that have come under my observation perfect occlusion has been absent.

With the interdental vulcanite or aluminum splints we are assured of good occlusion and generally symmetry of the face. An advantage also of the aluminum splint is its easy adaptation, and the freedom that the patient enjoys in the mastication of food. It is my custom to use the vulcanite splint in those cases where the displacement is extensive; but with either appliance I am insured of immediate union and a good result.

I cannot impress too strongly the necessity of thorough cleanliness of the oral cavity while a splint is in position. Abscessed conditions present themselves which many times are due to pressure at the point of fracture. For this reason I discard the external splints, which I think should never be used in any case.

I have two casts here which I will be very glad to pass around for your inspection. The first is a fracture between the canine and lateral on the left side. This injury happened to a boy who fell down an elevator shaft, the only injury which he sustained being a fracture of the mandible. The impressions were taken on the day of the accident, the aluminum splint was prepared and put in place, and he went back to work three days after. There was some displacement, but not very much, and perfect occlusion was secured when the case was finished.

The other cast represents the case of a patient who had been kicked by a horse. The maxilla was fractured on the left side, in the region of the bicuspid and molar, the process being broken so that it included the antrum. I used the rubber vulcanite splint in this case. This vulcanite splint, you will notice, does not cover all the teeth. I believe it is a much more simple matter and a good deal better for the patient to have a small splint; you can keep the mouth in a much more cleanly condition. An interdental splint of rubber that is only an inch long, I have found does good service.

Then, regarding the bandaging of fractures: I personally feel that the four-tailed, of which the essayist speaks, and also the Barton bandage, besides causing pressure are very difficult to keep in position, no matter how skilfully and carefully applied. The patient's restlessness while sleeping will loosen them.

I have devised a head-gear made of webbing one inch wide, in skull-cap fashion, with two buckles, attached to which is a chin-piece, and while I never knew of plaster strips being used until now told by Dr. Marshall, I assure you this will do the work just as effectively.

As to fracture bands, I have never been able to make a success of them, for if placed too near the fracture (and they must be to get good apposition) they invariably loosen the teeth, and in such a case as No. VIII described by the essayist, with bands on the first bicuspid and first molar in a fracture in the second bicuspid region, and presenting considerable displacement, I should expect a very poor result, and only wish Dr. Marshall could tell us personally the outcome as to occlusion, and if any teeth were lost, as the post surgeon's report of a "good recovery" is very indefinite.

Dr. F. A. Greene, Geneva, N. Y. My remarks will take the form as in a symposium rather than a formal discussion of Dr. Marshall's paper, as it would not be practicable to discuss a paper thoroughly from simply hearing it read. I presume that I am in the position of a great many other dentists—I do not have many opportunities to treat fractures.

But I have had a few, and fortunately for me they have been comparatively simple cases, namely, those cases that most often occur in the anterior portion of the mandible, between the first molar and the canine. An appliance which I have devised, and which is here shown, has been used in two cases, and with very satisfactory results indeed.

To operate the appliance, I first take an impression of the upper and lower jaws, and procure casts with the mandible in the position that it was left in after the fracture. I then cut the cast apart at the point of fracture, and adjust the fragments to restore the articulation. I then make an interdental splint of rubber, *A* (Figs. 1 and 2), allowing the teeth to occlude as closely as possible, with a place for the lower teeth to fit into, and a slight indentation for the upper teeth. The purpose of this is, that it does not necessitate fastening the lower jaw to the upper. With this appliance the patient can move the mandible. This comprises the external dental splint in combination with the interdental, and the external splint is always ready. It might be a good plan to have about three external splints of different widths for different cases.

The external splint is made of hard brass, nickel-plated, with a cloth chin-piece *J* (Fig. 2), and connected to the interdental splint at *B* (Fig. 2) by the extensions upon the forked attachment *c, c* (Fig. 1). It will be readily seen —from the extensions *c, c* fitting loosely in the sockets of the interdental splint, and also the projecting arm *d* (Fig. 1) fitting loosely at *C* (Fig. 2)— that when the side arms *D* (Fig. 2) are drawn down and tied to the base-piece *E* (Fig. 2) the pressure must be equal upon all parts of the jaw. There is a hinge joint at *F* (Fig. 2) to allow the side arms and base piece to be drawn together.

The perpendicular adjustment (to fit different cases) is made by the thumb-screw *G* (Fig. 2), and the horizontal adjustment is made by the thumb-screw *H* (Fig. 2). When the case is ready to adjust, I take a little cloth bag (a little larger and of the shape of the cloth chin-piece), which I fill with very slow-

Fig. 1.

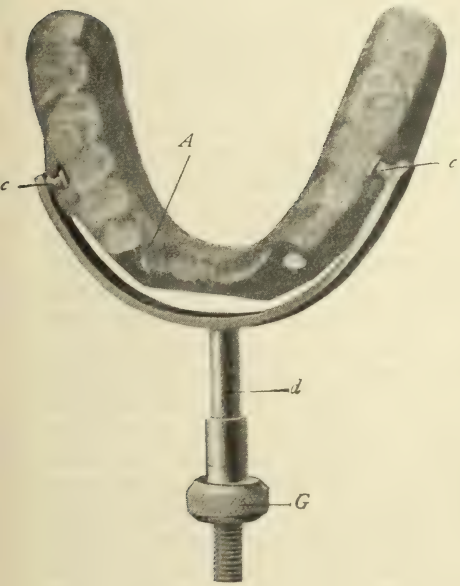
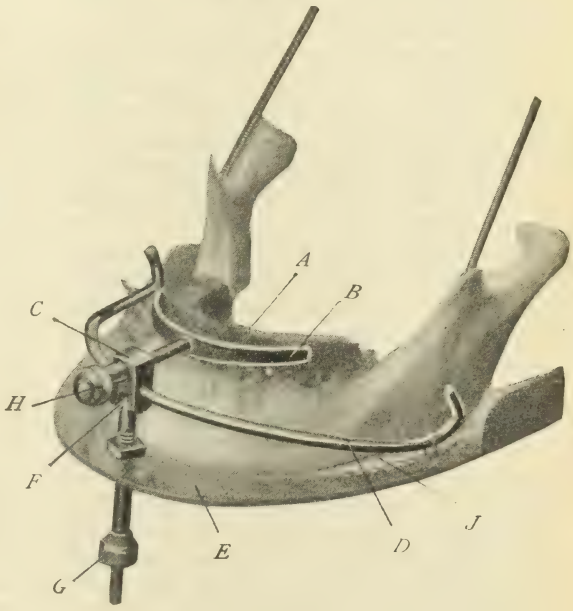


Fig. 2.



setting plaster of Paris, and when flattened out to be about one-eighth of an inch thick, I place this upon the cloth chin-piece, with a thin piece of rubber dam upon it and a thin sheet of cotton upon the rubber. (The rubber dam is to prevent the moisture from the plaster wetting the cotton.) I then adjust the interdental splint in place, attach the external splint, and draw the side arms down tight to the base-piece, and hold carefully in place until the plaster has set. Plaster may be made to set slowly by adding a little flour to it.

Dr. T. L. Gilmer, Chicago, Ill. Very few of the splints may be used with benefit, but the majority of splints used in the treatment of the mandible should be done away with. I would discard every splint for the treatment of a fracture of the mandible except the Heath splint. The one Dr. Keefe has described is the Heath splint with the addition of the external appliance.

Dr. Marshall speaks of wiring through the bone. This is necessary in some cases; but I think we should wire through the bone as infrequently as possible, especially in simple fractures, because of the additional danger incurred by the exposure of the tissues to infection.

In cases of fracture of the ascending ramus, or at any point posterior to the third or second molar, if most of the teeth or a sufficient number are in the mandible, the best results are obtained by wiring the upper teeth to the lower. This may be done with Angle's bands, it is true; but it is not so conveniently done, I think, as by wiring the upper teeth to the lower teeth. I believe that this is a better method of treating fractures in the angle or ascending ramus than by drilling through the bone, unless there are complications.

I discard the use of bandages because they may interfere with the circulation, and retard recovery.

In some cases the teeth are very closely approximated, and it is very difficult to get the Angle bands in place, while at the gingiva we can always carry through the small, annealed German silver wire, which is very soft. If in uniting the wires of the lower teeth to those of the upper we do not connect the teeth directly occluding, but, for instance, unite the upper first bicuspid to the lower second bicuspid, we do not have the direct pull to loosen the tooth, which Dr. Marshall speaks of. I have not seen in the twenty odd years of my practice in wiring teeth in this manner a single tooth loosened by it. If I were to wire only one tooth on each side, and nearest to the fracture, attaching the one above directly to the one below, there might be tension sufficient to loosen those teeth; but we do not wire them in that way.

Dr. S. E. Wallace, La Belle, Mo. I believe that Dr. Gilmer has been truly successful in this method of treatment of fractures. I know of one of the doctor's early cases, treated in 1887—a patient aged fifty-eight years, and at that age we always find the alveolar process is slow in healing and reuniting.

The case was a compound comminuted fracture of the mandible. There was a break on the left side on a line with the first molar; on the right side there was a fracture at the angle. The bone from this point extending up to and including a large portion of the lower half of the ramus, was broken into a number of fragments. The soft parts were lacerated only on the left side. All the teeth on the right side posterior to the fracture were missing. The posterior fragment of the compound fracture was elevated by the action of the masseter and temporal muscles. The anterior fragment, containing all the teeth of this jaw, was drawn toward the left side and greatly depressed, giving the patient an aspect anything but agreeable. The posterior fragment of the left side, which included the greater portion of the ramus and a part of the angle, was but slightly displaced. The treatment was as follows:

On the right side the gum was dissected from the bone on both buccal and lingual surfaces for about an inch anteriorly and posteriorly to the fracture. In each fragment a hole was drilled of suitable size to just admit a No. 16 standard gage platinum wire, which was

bent in the shape of a staple. Silver wire is used because it is less irritating and is supposed to be in a measure antiseptic. The fragment having been put in place the two arms of the staple were inserted into the holes from the lingual surface. The arms were brought together on the buccal side and tightly twisted, drawing the parts into close apposition. Next a short steel wire (No. 27) was placed around the neck of each lower tooth between the second bicuspid on the right and the second molar on the left side and the corresponding teeth of the maxilla. The two ends of each individual wire were brought together and twisted, fastening the wire securely around the neck of each tooth. This being done, the teeth of the lower jaw were exactly articulated with those of the upper, and the wires of the lower teeth secured to those of the upper by bringing them together and twisting, thus firmly lashing the lower to the upper jaw. To prevent a lateral motion the wire of the upper left central was secured to the wire of the lower right central, and that of the upper right central to the lower left; this crossing being continued throughout held the jaws immovable. The smaller fragments of the right side were pressed into place as nearly as possible. All outside appliances were dispensed with, the parts being held in place with sufficient firmness by the wires, therefore there was nothing to obstruct the circulation or interfere with the nutrition of the parts.

The patient was advised to thoroughly cleanse the teeth each day, as far as they could be reached, by means of a toothpick and a stiff brush. An antiseptic wash was ordered for frequent use. He was fed on liquid food by means of a long-nozzled bulb syringe known to physicians as a powder blower. The bulb of this syringe was filled with nutrient fluid and its contents discharged into his mouth through the aperture made by the loss of the teeth near the compound fracture. The external wound speedily healed and all seemed to go well until about the third week, when an abscess, probably caused by a spicula of bone unobserved when the fracture was reduced, formed just below the compound break.

A free opening was made into the abscess in such a manner as to establish a thorough drainage. The pus cavity was syringed with hydrogen dioxid and a rubber drainage tube sufficiently long to reach the bone was inserted. Every day, as long as the formation of pus continued, hydrogen dioxid followed by a solution of carbolic acid was forced through the tube. The drainage tube was held in place by three silk ligatures stitched in the lower end, the ligatures being secured to the face by adhesive strips. The fracture of the angle united in about four weeks, while the one with the external complications required two weeks longer.

At this time, the sixth week, the wires were removed, the patient being advised not to use the mandible for strong mastication for some time. The contour of the face is entirely restored, the articulation is good and there is but little left to indicate the miserable condition the patient presented when he first came under the care of Dr. Gilmer. I have seen this man many times since and the remaining teeth were in good order and none the worse off except that they were somewhat abraded, indicating the invaluable service they have rendered, all being firm in their sockets. The case was a severe test of Dr. Gilmer's method of wiring, and it has proved a perfect success in every respect. I heartily recommend the use of the wire ligature in the treatment of fracture of the mandible.

This case was in the hands of a reputable medical practitioner for four weeks before Dr. Gilmer took charge of it.

Dr. W. J. Roe, Philadelphia, Pa. The first point I wish to touch upon, somewhat at variance with the statement Dr. Marshall made here this afternoon, is that complete union, in many cases, occurs in three to four weeks. I have yet to see a case of union at the end of five weeks in which I have not been able to spring to an appreciable degree the fragments of the fractured parts. I will go farther: I have yet to see a case at the

end of six weeks in which I could not demonstrate an appreciable degree of springing by moderately gentle manipulation. Therefore I teach in practice retention of immobilization for a period of five, and in a majority of cases six weeks, in all cases treated by whatever means.

I am opposed—and I am glad that Dr. Keefe has expressed himself in accordance with my own views—to the operation of wiring in, I may say, all cases. I think that it can be avoided to the distinct advantage of the patient. As already said, it opens an additional avenue of infection if the wiring is done within the oral cavity; if done externally we are better able to take care of that feature.

I contend, and teach, that there is no fracture of any portion of the mandible which cannot be successfully treated by some form of dental or interdental splint. That seems, probably, on the face of it to be a sweeping assertion, but I am ready to substantiate it and maintain the point. Even in cases of delayed union or ununited fractures—and there is a very dangerous point—Dr. Marshall referred to a case today as one of ununited fracture of six months' duration between the injury and the time of operation. The case as referred to does not justify being so classed, unless he qualifies it by substantial evidence. I have seen cases at the end of nine months in which there was only fibrous union, or in which there was considerable mobility; I have seen those cases a year or a year and a half later in which the union had occurred. Therefore it is very important, when we seek to classify cases as ununited fractures, to know whether a case is yet past hope at that period of its condition, and the possibility of union occurring with immobilization with a proper method of treatment.

Reference is made to the use of adhesive strips as a most radical method. I have in three cases used something more radical, probably. These three cases were not in the hospital, and when out from under my care would habitually and inevitably become intoxicated, and consequently all the attachments were displaced and the splints out of the mouth. After being annoyed to a considerable degree by the actions of these patients, I had the hair cut closely to the head and then I applied plaster of Paris, covering with a tin cap carrying side pieces firmly attached, and they could then do what they liked, and the splint and bandage remained in position.

I have digressed from what I wanted to say in reference to cases of ununited fractures, in which it is necessary to operate to remove the intervening fibrous tissue, which will inevitably prevent ossification. Where it is necessary to operate, as it is in the case referred to, to remove the fibrous tissue that intervenes between the ends of the bone and to freshen the ends of the bone, I contend that the best results will be aided by the introduction and wearing of some form of splint as a retaining appliance, and not by the wiring of these approximal ends.

It is not necessary for me to enumerate or detail the points which are involved in the best results, but I can say that such a result is only obtainable by the adoption of some form of interdental splint subsequent to the excision of the fibrous tissue and the intervention of the bone.

It is surprising and almost incredible to note the results that we can obtain where there is a wide separation and considerable loss of bone structure, in this matter of regenerative re-formation of bony tissue. In a case where the chin or mandible was denuded on the left side I was obliged to take out sections of the bone, stripping up the periosteum for some distance on each side and with an instrument forcing it apart until it was separated a distance of three-quarters of an inch, and holding it in that position by the interdental splint. In the time it usually takes to treat the ordinary fracture the filling up by bony union of that intervening space was complete.

Dr. J. D. Patterson, Kansas City, Mo. I have a good deal of this kind of work, being fortunate or unfortunate enough to be dental surgeon to a railroad in our section of the country—and it is

upon railroads and in railroad accidents that in these days most of the fractured jaws occur.

It is my experience in the fractures which come under our observation, that each case demands a somewhat different treatment from the case which preceded it. I am heartily in accord with Dr. Roe when he says there is no form of fracture that cannot be better treated with an interdental splint than by any of the other methods. And when I make that statement and confirm this expression of Dr. Roe, I do so because I have tried other methods and have not been successful. I have had a variety of cases, and I have never yet had one that was not better treated by some form of interdental splint than with the methods of wiring that have been spoken of.

I have, as an emergency outfit when I am called by the railroad, a splint that was suggested in war times, and improved upon by Dr. Kingsley. It is a large impression cup for the lower jaw, is made of an alloy of tin, and contains slots for arms. I always pack the appliance into my grip, because we can make with it a splint in a few minutes, lining the cup with gutta-percha; it is very useful in an emergency case when we cannot get the patients to our office, sometimes having to go to a little railroad town, or perhaps a country farm-house. I always equip myself with this appliance, and among other things always take along what I call a "halter"; it is made of heavy leather, with an attachment to fit the chin, in which is placed cotton or cottonoid. Sometimes I use that appliance while I make the splint, and at times it is useful to put on while the patient is being taken to the hospital.

When we use the interdental splint it must be very thin, allowing the teeth to come close, in order that the healing there may be the best. We cannot allow much space, so we must make our splint of metal. Usually I make it of silver, and strengthen it by flowing solder over it at different points.

I want to speak of my experience with regard to fracture bands—the most useless things of all the magnificent things that Dr. Angle has put before the profession. He deserves and I give him all credit for what he has done in many directions, but the Angle fracture bands are, in my opinion, of no possible use. I have never had one case where they could possibly be applied, and have had two cases where other dentists applied them and did not succeed in reducing the fracture. One of these cases did not come to me for nearly two months after the Angle fracture bands were put in, and I am ready to tell Dr. Angle that the fracture bands are absolute failures. As long as we can so easily and rapidly construct some form of splint which allows the patient so much comfort, and permits him to eat solid food after a short time, perhaps even the next day—and this neither the Angle band nor wiring ever allows—I see no use for those fracture bands or methods of that description. In regard to wiring, I have wired the two ends of the bone together, but with little satisfaction.

I challenge anyone to bring me a case of fracture in which I could not apply some form of interdental splint. A case was brought to me some three years ago —an edentulous mouth—and there you are up against it, at least you suppose you are. The dentist and the physician to whom the patient first had gone put a wad of cotton in the mouth, held in place by some gummy substance, and wrapped his jaws together. You seldom find edentulous persons now who have not some form of artificial denture. When the patient was presented, I asked, "Where are the teeth you were wearing before your jaws were broken?" "At home." "Why didn't you bring them, and use them for a splint?" "I never thought of it." So they were brought to me, and I cut out where it was necessary to accommodate the swelling of the tissues, and in twenty-four hours I had the most beautiful splint you ever saw. So, when we have those edentulous cases, we generally have a partial or full plate that solves the difficulty of arranging the jaws or making the splint.

Many cases can be wired with good occlusion resulting; but the use of a

splint is easier, more comfortable for the patient, and, in my experience, is absolutely effectual.

If a great amount of the bone must be removed on account of non-union, it is surprising how much of that bone will be regenerated. Dr. Marshall will remember a case of gunshot wound at Kansas City, which I treated for a soldier.

Dr. Marshall. I refer to it in my paper.

Dr. Patterson. We did not cut into it to see how much of the bone was gone in that case, but I judge it was more than three-quarters of an inch, and one of the bones at the broken end was a mere spicula, while the other was a good blunt end. I put on a bridge splint; within six months from the time I put that splint on the bone had entirely re-formed. This I know, because I had to take the bridge off and make another, and I found the fracture as solid as a rock and more than three-quarters of an inch of good bone had re-formed with absolutely no give to it at all.

Dr. Arthur D. Black, Chicago, Ill. I believe that fully 99 out of 100 cases of ordinary fractures can be treated with the best possible results by the method of wiring the lower to the upper teeth. I also believe that the use of the interdental splint in treating fractures at this day is not giving the patient the best service. When I say interdental splint, I mean a splint that includes the occlusal surfaces of both the upper and lower teeth and requires a bandage to hold it in place. If you apply the term interdental splint to a splint which is applied to the lower teeth only, with possibly a masticating surface for the upper teeth, it is a very different matter. The interdental splint, as generally understood in past years, if I am not mistaken, was a splint modified from the old form of Gunning splint, in which there was a space for both upper and lower teeth, and this splint was held in place by bandages.

In fully nine out of ten cases of ordinary fractures without external wounds, we are not justified in using anything external on the face or head, and a man who would use an appliance of this kind [indicating mechanical device] in a case of this character, is not rendering his patient the best service. He may get quite as good results, but it is unnecessary to use an appliance which makes it unpleasant, and in some cases impossible, for the patient to go out upon the street and get the proper amount of exercise. I believe that in a majority of cases of fracture the patients should be on the street within two or three days, or at least within a week after the case has been treated, for by means of judicious exercise a quicker recovery will be made.

The question has arisen between Dr. Angle and Dr. Gilmer as to whether Dr. Gilmer or someone else was the first to use the method of wiring the lower to the upper teeth. I wish to mention the fact that such a case was reported by Dr. Gilmer in the *Archives of Dentistry* for 1887 (page 388), and a careful search through the literature on fractures does not reveal any case reported previously.

Wiring is used by Dr. Gilmer very largely in his practice and at our school. I believe the reason that many men fail in the method is because they do not wire a sufficient number of teeth. If you wire the teeth on both sides of the mouth, no matter where the fracture occurs, there is practically never any difficulty in maintaining the occlusion, and the matter of cleanliness—a very important and essential element—will be best subserved. It permits the thorough brushing of the teeth, and if there is an opening anywhere, it is possible to flush the inside of the mouth and cleanse the lingual surfaces of the teeth. There is in addition the advantage of being able to see the relation of the lower to the upper teeth at all times.

Dr. Patterson. In quite a number of fractures where the teeth are all in the mouth, circumstances might indicate wiring; but the teeth posterior to the break, or the two teeth anterior to the break are very often loosened; with the splint we can keep them in, placing them back firmly again. What do you

do in wiring? Do you wire the ends of the bone then?

Dr. Black. No. If the fracture was anywhere along the side of the mandible back of the bicuspids, and the teeth back of the fracture were loose, it is not necessary to wire those teeth, as the masseter muscle will hold them in position.

Dr. Patterson. There won't be any other teeth that are firm on that side. Suppose all the teeth are gone?

Dr. Black. If all the teeth are gone, or not enough remain to hold the upper to the lower jaw, you cannot wire the teeth together. We must suppose that there are enough teeth in the mouth to wire the upper to the lower teeth, and I believe in the majority of cases there are enough.

I recall a case which might more fully answer the question—the case of a patient with a fracture between the lower second and third molars. The entire mesial surface of the root of the third molar was exposed, so there was no hope of saving that tooth, as the case had been standing a week or ten days and pus was present, though the tooth could not be extracted at that time, as it was too firm. The teeth were wired, and in the course of two or three weeks that tooth became loose through alveolar necrosis and came out, and the full mesio-distal width of the tooth was lost from the body of the bone from the same cause. The wiring was done without paying any attention to the posterior fragment; the masseter muscle drew the fragment forward and upward in apposition to the anterior fragments, and union was obtained in that way. The occlusion of the teeth was correct, but there was a deformity in the lower border of the bone. If the fracture were farther forward in the mouth than the bicuspid, and if the teeth were loose on either side of the fracture, there would generally be enough teeth left to wire without paying any attention to the loose teeth close to the breaks.

I saw a case of a clothing salesman with a fracture in the canine region. In his case the molar teeth were wired without putting any wires on the incisors, and he learned to talk sufficiently plain in three or four days to be able to retain his position. Here are some models of cases in practice—the fractures in each case being marked with a lead pencil—and the wires are just as they were on the teeth. These casts were taken at the time the cases were dismissed and you can judge of the occlusion.

Failures in wiring teeth are caused, I believe, in many cases, by the use of the wrong kind of wire. If brass wire, silver wire, or any wire that will stretch is used, it will certainly fail. German silver wire of 22 or 24 gage, properly annealed by investing it in plaster and pumice and heating for fifteen minutes with a blowpipe, will give excellent results. It seldom breaks, and does not stretch.

Dr. Patterson. I had a case of fracture, about thirty years ago, where all the teeth were in the mouth. I wired the upper to the lower in beautiful shape, but the patient's mouth was so swollen it was pretty hard to get a tube around back of the third molar for the purpose of administering his liquid food. How do you get along with your feeding? If everything is clear sailing, some teeth missing on one side of the mouth, you can get the tube in and feed the patient pretty well; but where swollen, or all teeth are present, it is very difficult. You have to keep those wires on how long? With a splint, we have perfect relief from all that sort of thing.

Dr. Black. I see absolutely no reason for difficulty in feeding in any case where the teeth are wired together, whether any of the teeth have been lost or not. Anyone can demonstrate this by drinking liquid foods with the teeth held tightly together. I have had patients go for fourteen weeks in that way, and keep in good condition, taking light exercise every day.

The Chairman. Dr. Marshall is obliged to attend the meeting of another section, and wishes to close the discussion at this time.

Dr. Marshall (closing the discussion). If I had the time I would try to maintain every position that I have taken. There are two or three points I

want to speak of: This apparatus of Dr. Greene's is very good, and it does the work. But I have never seen a lady yet who would allow me to put such an apparatus in her mouth—or any other patient, in fact. The principle is all right and it does the work, but it is such a cumbersome thing, so complex and unsightly that my patients would not allow me to use it.

Dr. Gilmer, I think it was, criticized the method of wiring the jaws and adjusting the fracture bands. But there are certain cases, gentlemen, which you cannot treat successfully without wiring the bone, and others which are more easily and successfully treated by using Dr. Angle's fracture bands.

Dr. Gilmer. I do not contradict that; I know that very well.

Dr. Marshall. It was Dr. Patterson, then. There are cases that cannot be treated successfully in any other way than by wiring the bone.

Dr. Roe took issue with me about the case of reunited fracture of nine months' standing. That case was one of fracture from a blow upon the side of the face. It came from the Philippine Islands, where it had been treated without obtaining union and the patient was later invalided home to the General Hospital and turned over to me. Several methods had been used in that case—wiring the teeth together, and the interdental splint. In this case the interdental splint could not replace the ramus in its normal position. It was out of position and held there by fibrous union, and the only way in which it could have been treated and the parts brought into normal apposition was by cutting down upon the bone, removing the fibrous tissue, drilling the ends of the bone, and wiring the ends together.

The interdental splint cannot be used in any case of fracture of the ascending ramus; because the action of the temporal muscle draws the end of the fractured ramus forward, and the internal pterygoid muscle draws it inward, and you cannot hold it in position by such an apparatus or by using the upper jaw as a splint, and wiring the jaws together, as Dr. Gilmer does, and as I have done with the Angle fracture bands.

I have to take issue with the statement of Dr. Patterson. I believe the Angle fracture band a most beautiful apparatus for treating certain kinds of fracture—only simple fractures, however. I have never used one for a compound fracture that had much displacement, neither have I used one in a multiple fracture; but in simple fractures they are very serviceable and get rid of all toggery on the outside of the mouth.

Dr. Roe spoke of fractures not being united in three or four weeks, and said he had never seen a case in which he could not get motion at end of that time. I have seen many. I did not say "consolidation," I said union. There is a great deal of difference between union and consolidation. If I had said consolidation, then I would have meant that the bone had become hard like the other bone. In the union of a fracture there is a formation of cartilage which will eventually become consolidated into bone. I have known fractures to unite in three or four weeks—yes, in 17 days. I have known of fractures united in that time so completely that there was no perceptible movement at the site of the lesion. Those cases are on record. I believe Dr. Roe also said he never saw a case that could not be treated by the interdental splint. I have seen a good many that could not be so treated. For instance, in fractures through the ascending ramus, near the angle, just back of the third molar, an interdental splint will not bring the occluding surfaces of the teeth absolutely together—it is impossible; the appliance sets the jaws apart by just the thickness of the material left between the teeth, and a V-shaped space results at the point of fracture, and when it has united, the teeth do not occlude at the anterior part of the jaw. In the cases I have treated by the other method they do occlude.

Dr. Patterson. Grind off the occlusal surfaces of the splint—the easiest thing in the world.

Dr. Roe. The interdental splint I use in all cases with a fissure cut in so that

the teeth are not separated one particle; the splint is made with the teeth in occlusion.

Dr. Marshall. I was criticized also for using the wiring method within the mouth. Now, Dr. Gilmer said he would not use it because it brought about extra traumatism and infection. Of course it brings about extra traumatism but not necessarily an increased infection, and I never use it unless I have points of fracture where infection is already present, viz, compound fractures. I would not use it in a simple fracture. It is used in cases where the external tissues are lacerated and where there is a great deal of displacement, the muscles pulling both the fragments into abnormal apposition.

Dr. Gilmer. I want to ask this question of Dr. Patterson: He made the statement very broadly that there was no case at all that he could not treat with the interdental splint alone, without wiring together—

Dr. Patterson. I said I wanted to see them. I never had a case.

Dr. Gilmer. I wanted to ask him how he would treat this case without wiring: A fracture of the neck of the condyle; a fracture at the angle; a fracture at the region of the canine tooth on the opposite side; a fracture in the ramus, the upper jaw broken entirely in two and entirely loose from its connection above, and the parts projecting?

Dr. Patterson. I would make a splint. Of course if the fracture is in the ascending ramus the pulling of the temporal muscle would, I suppose, displace the fragments. I am speaking of my own experience, which is quite broad, but I never had such a fracture as the one mentioned. The gist of the matter is, do you wire the fragments in fractures of the condyle? No, the splint would be used, and by bringing the teeth together the desired result would be obtained; but if there is so much displacement as in the case shown by Dr. Marshall, I do not know what I would do except to wire. But in a fracture back of the third molar, or a fracture at the condyle, certainly I would use a splint.

Dr. Greene. I have had occasion to use this apparatus of mine twice, and it answers very nicely. When Dr. Marshall says he never had a patient who would allow him certain things, I do not think Dr. Marshall takes the right stand. I never ask a patient what to do. As a rule patients are not competent to judge.

In certain cases I can see where wiring will work nicely. I think if Dr. Marshall could only, after he has put on the appliance he has described, take it off, and put on this appliance of mine which would allow the patient to move his jaws, I believe the patient would be glad to have the change.

The Chairman. I feel, in the absence of Dr. Angle, that someone might justly add a word in support of what is known as Dr. Angle's splint. I wish to say that there is no reason in the world why in cases in which the line of fracture is clean—when not in any way comminuted, and not a multiple fracture, they cannot be advantageously treated by at least one of Angle's methods. I see no reason why bands cannot be satisfactorily adjusted; not to the next tooth on either side, because the point raised by Dr. Patterson is a practical one for the reason that the teeth are usually loose on either side—but two or three teeth removed from the point of fracture on either side, with good long tubes soldered to these bands in a parallel direction. With screw bar and nut to hold, this gives absolute fixation of the jaws; there can be no movement of that mandible, or anything to interfere with union. One also has an advantage which has not been referred to, that of being able to reach the surface of the mucous membrane, to keep it clean and in a reasonably aseptic condition. Thus the patient is allowed to go on about his work, usually almost immediately, or in a very short time, when the inflammation due to the traumatism has subsided; and the patient may also be allowed to use the jaw for mastication to a reasonable extent without trouble.

In making a splint, I try to keep in mind, first, immobilization, and a fair

approximation of the fractured parts with good occlusion, and second, facilities for thoroughly cleansing with antiseptics, and for examining occasionally, if possible, the surfaces of the mouth in the vicinity of the fracture. One must also consider that notwithstanding the fact that patients are able to live a long time on liquid food, it is very disagreeable to be required to do so, and if able to take solid food, it certainly is an advantage. Then one should, if possible, view the surfaces of the adjacent teeth from time to time to know whether devitalization of the pulp has occurred, and be able to remove the septic condition by thoroughly cleansing the canals.

I believe that is what Dr. Roe accomplishes with the interdental splint more than any others with the wiring appliances which require the fixation of the jaws together, and such a method as the latter I believe should be used with a great deal of judgment.

Dr. B. C. Nash, New York, N. Y. A method of splinting was shown by Dr. D. Genese of Baltimore, at a First District Society meeting, which consisted of first ligating the teeth with gilling twine —then securing an impression to which was applied a splint made of the ordinary metal strips used for polishing between teeth, a number of thicknesses being put together and soldered until a rigid splint was obtained, through which holes were drilled for ligatures. The attachment was made with gilling twine, and tension insured by split shot. To reinforce the splint, a pad filled with plaster of Paris was applied to the chin and a bandage drawn up over the head. It was only necessary to have this bandage in place for three or four days, when the patient was able to use the jaws to a certain extent. A full description of this method was published in the Dental Cosmos of May 1904 (vol. xlvi, p. 387).

Dr. Keefe. I plainly perceive that we have our wire enthusiasts, and our splint enthusiasts. I certainly am a splint enthusiast. I cannot see why in practice you want to wire the two jaws together. Why not use a little aluminum splint cemented to the mandible, and the patient can go about as usual. I think Dr. Patterson's criticism regarding the Angle band was not applied to the one Dr. Brown referred to. It is the one that connects both jaws together that Dr. Patterson talked about, as I understood.

Dr. Patterson. That is right.

Dr. Keefe. I certainly agree with Dr. Patterson on that point.

Adjourned until Thursday, September 1st, at 2.30 p.m.

Third Day—Thursday, September 1.

The section was called to order by the chairman, Dr. George V. I. Brown, of Milwaukee, Wis., who invited Dr. James M. Magee, of St. John, N. B., to preside as honorary chairman.

The proceedings were commenced by the reading of a paper by Dr. E. S. Talbot, of Chicago, Ill., entitled "Etiology of Cleft Palate," as follows:

Etiology of Cleft Palate.

Beautiful as is the human face in its most perfect phase, it yet is, from the standpoint of food-getting, as Minot has shown, an embryonic type. The jaws are needed less and less for purposes of food-getting, chewing, and combat, hence the resultant disuse sacrifices them, under the law of economy of growth, for the benefit of the growing brain and nervous system, and to meet the need which the first of these has of the dermal elements of the skull. Under the operation of the law of economy of growth there has occurred the esthetic evolution of the face from the anthropoid to the Apollo Belvidere type, as well as the reverse phase of this, where symmetry of the body as a whole, to preserve brain gains, is sacrificed to changes in the nose, jaws, alveolar process, and teeth. This struggle for existence strains most developments of points of ossification, and as it is aided by primitive type heredity, spends much of its force on the structures which have gained for race purposes, like the jaws

and the teeth. The palatal bones are therefore affected.

Cleft palate is divisible into congenital and post-congenital. The post-congenital, while having a predisposing factor of teratologic nature, is often produced by a determining nosologic factor. Congenital cleft palate is divisible into two kinds, complete and partial: *complete*, when the fissure extends the entire length from the uvula to and including the anterior alveolar process and even the lips; *partial*, when only a small part of the structure is involved. Thus the cleft may extend through the anterior alveolar process involving only the incisive bones, which is very rare; when present, single or double hare-lip almost invariably coexists. Cases occur where a small portion of the anterior alveolar process and jaw are involved with one or two teeth. The hard palate may be merely involved to the extent of a small fissure, or the whole palate may be wanting. The soft palate may contain the cleft, or the uvula alone may. Cases occur in which the non-development of the intermaxillary bones produces lip fissures.

The problems involved in cleft palate are those of embryogeny as modified by the law of economy of growth, by remote atavism, by type heredity, and by the results of characters acquired during the periods of dentition and adolescence, and prior to the senile stage. As soon as the external nares are separated from the mouth in the embryo, there occurs, as Minot has shown, a partition between the nasal pits and the mouth. This partition, in which the intermaxillary bone is differentiated later, is supplemented by another partition, the true palate, which shuts off the upper part of the oral cavity from the lower, thus adding the upper part to the nasal chamber. The palate is a secondary structure which divides the mouth into an upper respiratory passage and a lower lingual or digestive passage. The palate arises as two shelf-like growths of the inner side of each maxillary process and is completed by the union of the two shelves in the median line. The shelves so arch as to descend a certain distance into the pharynx, but in the pharynx their growth is arrested, though they may be still recognized in the adult.

In the region of the tongue, which includes more than the primitive invagination of the oral cavity, the palate shelves continue growing. At first they project obliquely downward toward the floor of the mouth and the tongue rises high between them, and appears, in sections which pass through the internal nares, to be about to join the intranasal septum. As the lower jaw grows, the floor of the mouth is lowered and the tongue is thereby brought farther away from the intranasal septum. At the same time the palate shelves take a more horizontal position and pass toward one another above the tongue and below the nasal septum, and meet in the median line, where they unite. From their original position the shelves necessarily meet in front (toward the lips) first, and unite behind (toward the pharynx) later. In the human embryo the union begins at eight weeks, and at nine weeks is completed for the region of the future hard palate, and by eleven weeks is usually completed for the soft palate also.

The palate shelves extend back across the third and second brachial arches. By migration of the first gill pouch, or in other words of the Eustachian tube, the Eustachian opening comes to lie above the palate (uvula), while the second cleft remains lower down and lies below the palate as the outline of the tonsil. The uvula appears during the latter half of the third month as a projection of the border of the soft palate. Soon after the two palatal shelves have united, the nasal septum unites with the palate also, and thereby the permanent relations of the cavities are established.

In dealing with the influence upon embryogeny of the factors named, the influences of disturbances of balance at an early period, which would strengthen disappearing structures at the expense of later acquired structures, have to be considered. Such a disturbance would overcome the effects of disuse and create overgrowths of primitive structures at

the expense of later acquired structures, leading to arrest, atrophy, or even disappearance of these last. The structures of the mouth and nose being exceedingly variable in evolution, and the structures of the jaws and teeth having in man taken an embryonic trend for the benefit of the body as a whole under the operation of the law of economy of growth, disturbances of balance are peculiarly apt to occur here. Not only is actual growth upset by the operation of this disturbance of balance, but certain potentialities are likewise interfered with. Up to the age of three years the central nervous system gains at the expense of the other structures. After this period the other structures gain, but the nervous system, while growing, does not maintain its supremacy in growth.

Interferences with palate formation must begin comparatively early in embryogeny, and hence must imply decided defect on the part of the parents. Any maternal factor, whether arising during a particular pregnancy or inherited, may so check the development of the palate as to produce the various types of deficiency which are observed by surgeons. The influence of heredity requires no special discussion, since it is involved as a rule in serious general defect rather than in localized. Furthermore, maternal environment plays here as elsewhere an enormous part. A defective mother may be so influenced by favorable environment during the first three months of pregnancy, or by removal from bad parental environment during the same period, that the embryo would not only pass through these periods of intrauterine stress successfully, but would likewise acquire increased potentiality of passing through the later periods successfully. On the other hand, an evil environment, or an environment changed for the worse soon after impregnation, unfavorably affects embryogeny.

In dealing with the development of the palate, both pre- and post-congenitally, the relations of the hypophysis or pituitary body have to be taken into account, since it has been well demonstrated that this body exerts an influence over body growth and the structures thereto related. The hypophysis arises in all vertebrates as an evagination of the ectoderm near the dorsal border of the oral plate, but is separated from the plate by a fold of the ectoderm. The hypophysis at one stage of its development in mammals is a diverticulum of the oral cavity with one wall attached to the brain and the other formed by a fold dividing the hypophysis from the mouth. The hypophysal diverticulum later elongates and its upper end expands to a considerable vesicle, the lower end remaining narrow as the pedicle. The floor of the brain forms an outgrowth behind the hypophysis, which is the representative of the infundibulum. The cementing together of the buccal and cerebral ectoderm over the hypophysal area causes the formation of the two diverticula. The hypophysis then grows rapidly; the pedicle elongates and its lumen is obliterated. The mesenchyma condenses to form the base of the skull (sphenoid). The pedicle entirely aborts, but the position for its passage through the sphenoid, while remaining for some time after birth, in about 10 per cent. of children dying in hospitals is ultimately obliterated by the growth of the sphenoid cartilage.

The infundibulum contributes to the production of the adult hypophysis in mammals, but in lower vertebrates it persists as an integral part of the brain, and is differentiated into ganglionic tissue. The pointed end undergoes a knoblike enlargement which later loses its cavity. Although the differentiation of nervous tissue begins in it, its cells early acquire an indifferent character. It is penetrated by bloodvessels and connective tissue, but the connection with the brain is permanently retained. In the adult the knob, although regarded as the posterior lobe of the hypophysis, is in no sense a part of it. Strain on the development of the hypophysis after birth can not only produce undue growth of bone, but can also check development of it. The influence of the periods of stress during the last months of pregnancy may arrest palatal development, due to inter-

ference with the bone-forming function of the hypophysis checking the development of bone and cartilage necessary to proper evolution of the palate.

"The antecedent," according to Oakley Coles, "which strikes one *a priori* as being likely to play the most important part in the production of congenital deformities is that of hereditary influence. But though it will be evident that the direct influence of heredity in the production of cleft palate is marked and undeniable, no sufficient statistics have as yet been brought forward to show that the actual presence of deformity in the parent has any direct predisposing influence on the child. In other words, though the defective conditions which precede and accompany the phenomenon of cleft palate are almost certain to be referred to parental influence, it is extremely doubtful whether cleft palate is in itself transmissible."

Here appears that antiquated view of heredity which takes into account only direct transmission. Heredity involves the complex of type heredity, remote atavism, individual defects or peculiarities of immediate ancestors, maternal environment and stress period environment. Direct heredity can operate only when, in embryonic existence, by the law of economy of growth, the embryogeny is centered around a given line of least resistance during the struggle for existence between the organs for assimilable nutriment. While a defective ancestor may have defective children, the line of direct expression of the defect is interrupted by the influence of atavism, by the influence of varying environment during embryogeny, and during postnatal periods of evolutionary stress. That cleft palate may be transmissible, Demarquay, Roux, Trélat, Follin, and Duplay have shown, but such transmission is and must be rare, from the factors unfavorable to direct transmission entering into heredity, inclusive of maternal environment during embryogeny.

The deformity rarely occurs if at all, from maternal impressions. In most of the cases which have come immediately under notice, when one parent had a cleft palate all the children have been born perfectly developed, even though dread of transmitting the deformity was never absent from the mind of the mother. In one case, three members of one family have cleft palate—one seventeen years, another thirty, and the third thirty-five. The first and last are women, the other is a man, married and with a family without any trace of the father's deformity. No instance of cleft palate could be found among ancestors or collateral branches of the family. In another family I have obtained the following remarkable history: G. H. C., born 1853; perfect. L. C., born 1855; single hare-lip and cleft palate. J. F. C., born 1856; perfect. F. W. C., born 1860, double hare-lip and cleft palate. H. E. C., born 1863; perfect. The paternal grandmother had cleft palate.

Five per cent. of 1200 criminals examined by Knecht had cleft palate. In an examination of 495 criminal boys at the Illinois State Reformatory and 1080 at the New York State Reformatory only one case in each institution was observed. Fourteen per cent. of the prostitutes examined by Pauline Tarnowsky had cleft palates. Langdon Down found only $\frac{1}{2}$ of one per cent. of cleft palates among congenital idiots. Gresnor found nine cases in 14,466 children, or one in 1607. I examined 1977 feeble-minded children without finding a single case. In 207 blind, but one case was observed; in 1935 deaf mutes two cases, or about one in 1000. The percentage among the defective classes is undoubtedly much larger than among normal individuals, but early deaths explain the small percentages.

Bland Sutton's experiments with dogs indicate not only the presence of this deformity among animals, but its transmission. Hereditary defects are evident in the statistics of zoölogical gardens. A keeper of the Zoölogical Gardens in Philadelphia observed cleft palate in the mouths of lion cubs born in the gardens. Cleft palates were also observed in a number of pups born in Buffalo. Ogle found that ninety-nine per cent. of the cubs born in the London Zoölogical

Gardens had cleft palates. This was ascribed to the artificial diet of the mother as the result of enforced captivity. Similar results in other gardens in Europe were charged to maternal feeding with meat without bones. Feeding with the whole carcass of small animals greatly diminished these deformities. If cleft palates were sometimes attributable to this cause, other bony structures should likewise be involved. It is hence not astonishing to find many rhachitic lions born in captivity. Cleft palate has been observed among dogs, sheep, goats, etc. The question whether domesticity does not have in them the alleged parasitic influence of civilization in man can only be solved by knowledge as to the frequency of deformity among wild animals of the same zoölogical families.

The difficulties of securing data of the occurrence of cleft palate among wild animals are sufficiently shown by the following replies to the question: *Have you ever observed cleft palate among wild animals not in captivity?*

Professor Osborn is in Europe, but in his absence I have attempted to find an answer to your query in regard to cleft palate. I looked through Windle's 11th to 15th "Report on Recent Teratological Literature" (*Journal of Anatomy and Physiology*), and also in several encyclopedias and surgical books, without success; I also asked Dr. J. A. Allen, one of the leading mammalogists of the country, if he had ever noted cleft palate in wild animals not in captivity, but he had never noted a case.—Wm. K. Gregory, American Museum of Natural History, New York city.

In reply to your query, I can say that I have never observed and do not recollect having heard of a case of cleft palate in wild animals not in captivity.—J. Symmington, Queens College, Belfast, Ireland.

I have not seen a case of cleft palate in any wild animal.—Wm. Turner, Edinburgh.

I have never observed a case of cleft palate among wild animals nor have I ever heard of one. Several years ago, lion whelps were born with cleft palate in the Zoölogical Gardens of London.—Bland Sutton, London.

I have only experience of wild animals bred in captivity. In the Zoölogical Gardens of Dublin, which I had the supervision of for many years, we have bred lions (between 200 and 300) since 1856. Only very occasionally did cleft palate or other deformity appear among the cubs—only once during my time, if I recollect rightly. Of course in my museum work I have had many wild animals pass through my hands which were not bred in captivity, and I never saw a case of cleft palate. At the same time it should be remembered that many collectors would reject a deformed specimen.

In the London Zoölogical Gardens, cleft palate among lion cubs used to be very common, I understand.—D. J. Cunningham, University of Edinburgh.

In reply to your letter of the 1st instant, I know of only one case of wild animals being born with cleft palate; the knowledge of this I owe to Mr. R. T. Powch, superintendent of these gardens. He informs me that a litter of tiger cubs born of wild parents were brought up by an English lady in Burmah and found to have cleft palate. As you perhaps know, lion cubs have so constantly a cleft palate that it seems almost if not quite normal for them to be so born in menageries. —Frank E. Beddard, Regent's Park, London.

In conversation with Mr. Hagenbeck of Hamburg, who has a large menagerie of wild animals, and who furnishes the zoölogical gardens of the world with their material, he informed me that he had never seen or heard of a case of cleft palate among wild animals.

This negative evidence is not equivalent to demonstrating the absence of cleft palate among wild animals, for, as I have elsewhere pointed out, animals destroy, soon after birth, offspring which to them appear peculiar. Cleft palate predisposes to infection by pathogenic bacteria and hence offspring born in a wild state are not likely to survive. Cleft palate, moreover, is quite frequently associated with deep-seated affections of the nervous system or of the locomotive apparatus.

In the evolution of the palate, ossification is the central point as regards completed development. Arrest of ossification, or of its potentiality, plays a considerable part in determining the permanence of cleft palate. Reported cases show that the condition is one which sometimes requires merely a temporary stimulus to growth to disappear. The

arrest is one of potentiality, not of permanent development. The palate bone develops from a single center at the angle of junction of the two plates of the bone.* The center makes its appearance about the second month. Appearing thus early, it has an impetus which survives the stress of the different periods of intra-uterine development and maternal environment. The influence of type heredity aids rather than arrests ossification of the palate, since tendency to ossify occurs thus early.

The relationship between palatal vault deformities and cleft palate, pointed out by Oakley Coles, is that existing between atrophies, hypertrophies, and arrests of development everywhere. Instability of trophic functions is shown as much in hypertrophies as in atrophies. The instability may affect not only development but potentialities of development, which it may arrest ere the period when the potentiality is to pass into fulfilment. The same factor which prevents sexual development at the period of puberty may prevent proper development of the vault at the sixth year. The frequency of what may be called palatal hypertrophy as compared with the deficiency shown in cleft palate is an illustration of this impetus. The ease with which the tendency to cleft-palate offspring is remedied by diet in the menageries shows that the ossification potentialities need but a slight stimulus. Influences interfering with proper development of the hypophysis, which is in such close embryogenetic relations with the palate, interfere with the onset of ossification, or with its proper development.

From the angle of junction of the two plates of the bone, ossification spreads inward to the horizontal plate, downward into the tuberosity and upward into the vertical plate. In the fetus the horizontal plate is much longer than the vertical, and even after it is fully ossified the whole bone is at first remarkable for its shortness. The palate hence requires an additional period to develop after ossification. The complicated relations of the palate to the turbinated and maxillary bones, both under stress from the law of economy of growth as varying structures, place it under varying conditions of nutriment, expressed either in excess or in the deficiency shown in cleft palate. The fact that the palate is permanent compared with the turbinates and the rest of the maxillary bones, indicates that, aided by its early ossification tendencies, it tends to survive in the struggle for assimilable nutriment. Heredity of long standing, however, sometimes so affects early development of the palate as to give the other two bones an advantage. This occurs where the pre-conceptional vitality of the mother is lowered, or where the first two months after conception are periods of extreme maternal strain. Paternal vitality when lowered affects the early conceptional period. This, to some extent involves an influence on maternal vitality, since, as has been repeatedly shown, chiefly after maternal breakdown does paternal defect show itself. In Mongoloid idiocy, as W. A. Hammond* has shown, early pregnancies when the mother is healthy are free from such offspring, but later births are of this type.

To such an extent is this maternal vitality in evidence that even syphilis may not arrest development. Thus, as in a case reported by Engel,† the husband may be infected during the second month of his wife's pregnancy and immediately infect her. A hearty boy is born with copper-colored eruption about the anus and later coryza. These symptoms disappear under specific treatment, not to return. The child does not have tertiary lues, but, unlike the ordinary cases of congenital syphilis, the secondary stages.

The factors involved in the reproduction of congenital cleft palate are, it is clear from the foregoing facts, partly of an embryogenetic nature which is connected with ossification evolution—which last, in turn, is involved in hypophysis development. These factors are not

* "Gray's Anatomy."

* "Neurologic Contribution."

† Kassowitz, *Jahrh. f. Kinderheilk.*, B. xxi.

necessarily connected with heredity, albeit the influence of maternal environment cannot be completely excluded. The influences checking palatal development must be present very early in embryogeny, since the palate ossification center is quite early in evidence. The factors affecting this ossification center may entirely arrest ossification, may arrest it irregularly, or may merely arrest its potentiality. In the latter case improved maternal environment has favorable results. In hereditarily defective cases, however, there is an irregularity of balance giving an undue sway to certain early acquired structures at the expense of others later acquired, which leads to increased irregularity rather than to its disappearance. The influence of hypophysis extracts on deficient osseous development is as yet merely suggested; sufficient is known, however, to indicate that it might be well to use hypophysis extract in cleft palate, proceeding on the possibility that the arrest was merely an arrest of potentiality, not an arrest of growth.

Discussion.

Dr. J. G. KIERNAN, Chicago, Ill. There is one factor to which Dr. Talbot has called attention that has not hitherto been considered in connection with facial development and degeneracy. This deserves the more attention because it opens up a therapeutic possibility. That the hypophysis has relations with bone growth is now generally admitted. That it produces abnormal growth at the expense of the organism is also admitted. The corollary from this, that what produces abnormal excess may supply deficiency has not yet been acted on in the case of structures where this corollary is indicated. The relationship of the hypophysis to facial development decidedly indicates the use of hypophysis extracts in cleft palate and allied states. It must be remembered that, as shown by the results of operations, many of these states retain potentialities which need only a slight stimulation.

THE CHAIRMAN. If there is no further discussion, we will consider the subject passed. The secretary desires to read some papers by title.

THE SECRETARY. I have here a paper by Dr. Thomas Fillebrown, of Boston, Mass., entitled "Anesthesia for Oral Operations." Dr. Fillebrown is unable to be present at this meeting. [This paper was printed in the March issue of the DENTAL COSMOS, at page 310.]

The Chairman announced as the next order of business the reading of a paper entitled "The Importance and Methods of an Early Diagnosis in Malignant Tumors of the Maxillary Bones," by A. HAMILTON LEVINGS, M.D., professor of oral surgery, Wisconsin College of Physicians and Surgeons, Milwaukee. The paper here follows:

THE IMPORTANCE AND METHODS OF AN EARLY DIAGNOSIS IN MALIGNANT TUMORS OF THE MAXILLARY BONES.

The importance of an early diagnosis in the case of a malignant tumor affecting one of the maxillary bones, its periosteal covering, and the muco-periosteal lining of the antrum, can scarcely be overestimated. Upon an early diagnosis may rest a very conservative and still successful treatment in the case of the mildly malignant growths. In tumors which are decidedly malignant an early diagnosis is absolutely essential in order that the patient's life may be saved by timely operative interference. It is pretty well established that in some of the giant-cell sarcomata, invasion of surrounding structures or metastasis does not occur for a few months, or perhaps during the first year. On the other hand, in many of the round-cell sarcomata and in some of the endotheliomata and carcinomata, regional or distant infection is likely to take place during the first weeks or months of their growth. In these cases, if operation be deferred beyond this time it will be too late, ordinarily, to save the patient's life.

In the majority of the malignant tumors of the maxillary bones the first symptom is a pain in the jaw or in the tooth. Following this there may be swelling, and then ensues loosening of

the tooth or teeth. With these symptoms the way is made easy for patient and dentist to consider the trouble as of no great moment, or as one which most concerns the tooth.

The importance of an early diagnosis is so great that in every case of pain in a tooth or in the jaw, especially if later associated with swelling of the gums or expansion of the bone, the physician or dentist should not consider himself as having done his whole duty to his patient unless he has exhausted every method at his command which could aid him in establishing a correct diagnosis. When one considers the disastrous results of delay in these cases, the responsibility resting upon the physician or dentist is very great.

Every case of tumor of the maxillary bone should be considered possibly malignant until it has been proved benign. At least half a dozen cases of round-cell sarcomata taking origin from the maxillary bones or their coverings have come under my observation in which treatment has been carried on for five or six months under the mistaken idea that the patient was suffering from necrosis or caries of the jaw, neuralgia, or chronic pyogenic infection. In other cases there has been no especial effort to establish a diagnosis, the cases being treated as of no great importance and expectantly until such time as the diagnosis might become clear. The case is usually then non-operable. In any case of odontalgia, or in any case in which there is a pathological process going on in the maxillary bones, any delay in making a diagnosis or in not using all the means for that purpose at our command is absolutely inexcusable —one might almost say criminal. An early diagnosis may be difficult, but an early diagnosis is possible in nearly every case if one be on the alert and fully prepared to use every means at his command for that purpose.

CLINICAL METHODS OF DIAGNOSIS.

In our efforts to reach a diagnosis it is of the first importance that we have a clear understanding of the symptoms and course of the malignant growths implicating the maxillary bones. We should, if possible, differentiate the malignant neoplasms not only from the benign but also from those pathological processes within the bones, periosteum, and teeth which are produced by infection or chemical action. The malignant tumors which implicate the maxillary bones or their coverings are the sarcomata, the endotheliomata, and the carcinomata. The sarcomatous growths are divided according to the shape of the cell into large and round-cell sarcomata, large and small spindle-cell sarcomata, and the giant-cell sarcomata. It is necessary to keep these species distinct in one's mind, because the malignancy of these growths depends largely upon the shape and size of the cells.

As is well known, the sarcomatous growths take origin from the connective tissue, and in these situations they may spring from the periosteum covering the bone, from the alveolo-dental membrane, from the muco-periosteal lining of the antrum of Highmore, and from the osteogenetic layer lining the medullary or Haversian canals. They usually occur before middle life. A goodly number of cases have been observed even in young children. The patients often give a history of an injury which may have been the exciting cause. These tumors are not encapsulated or circumscribed, and only infrequently infect the adjacent glands. There are two varieties of sarcomatous growths which take origin from the periosteum. One of these is known as an epulis, the other as a periosteal sarcoma. The epulis is a soft, rather rapidly growing, well circumscribed, comparatively painless tumor, which bleeds easily, has a reddish color, takes its origin either from the mucous membrane of the gum at the border of the tooth or teeth, from the outer layer of the periosteum covering the bones, or from the alveolo-dental membrane lining an alveolus. The growth is in direct relation with the crown of one or more teeth, along which it is projected toward the free border. It may require several months, perhaps a year, to reach the size of a small almond nut.

During this time, the teeth may be loosened in their sockets in consequence of the growth implicating the alveolo-dental membrane. It is to be differentiated from the fibroid epulis, which is much harder, grows slower, does not bleed readily, and is covered with a normal mucous membrane. Microscopically, the epulis is often a mixed growth containing giant and spindle cells, the former usually predominating.

The second variety of the sarcomatous growths take their origin from the osteogenetic layer of the periosteum or from the alveolo-dental membrane. They are consequently primarily situated between this membrane and the bone, or within a tooth-socket. Some of these tumors grow very slowly, others grow rapidly. They are oval, elongated, globular, and seemingly well circumscribed or diffused tumors which are immovably connected with the bone. They are quite hard and smooth, and usually have a pretty uniform consistence. In some cases, however, they are very irregular upon the surface, and may even contain cysts. If situated upon the inferior maxillary bone they may cover but a limited area or completely surround the bone. If taking origin from the alveolo-dental membrane of the superior maxillary bone they often invade and even fill the antrum or extend over the surface of the bone as an irregular mass. In one of my cases, that of a round-cell sarcoma, the process having begun in a tooth-socket of an ulcerated tooth spread rapidly along the gums to the tonsil and soft palate upon the inside of the jaws, while upon the outside it invaded the cheek and adjacent glands. The case was non-operable six weeks after its inception.

In a case of giant-cell sarcoma having the same origin, the process invaded the antrum and gums and spread along the anterior walls of the superior maxilla beneath the periosteum, producing a tumor of considerable size. This extent of growth was effected in about three months. A cure was attained by resection of the superior maxillary bone of that side. It is characteristic of many of these growths taking origin from a tooth-socket that they spread rapidly along the gums, infiltrating them and causing marked swelling. Some of the periosteal sarcomata are made up of giant cells, others of spindle cells, and others of round cells, or the growths may be mixed in character, containing perhaps round, spindle, and giant cells. A goodly number are osteo-sarcomata or osteo-chondro-sarcomata, in that they contain both bone and cartilage.

DIAGNOSIS.

The sarcomatous epulis is not likely to be mistaken for any other tumor, unless it be a fibroid growth in the same situation; but the increased vascularity, redness, softness, and accelerated growth of the former makes it ordinarily easy of differentiation.

A periosteal sarcoma other than an epulis is perhaps not so readily differentiated. When it occurs on the alveolar border of one of the maxillary bones or over the compact substance, it produces, as a first symptom, swelling which can readily be made out in consequence of the superficial position of the bone. This swelling is fixed, not well defined, and is slowly or rapidly progressive. The swelling is followed by pain which is seldom severe. Except in the most malignant cases there is no fever, or not more than one-half to one degree, and for weeks no glandular enlargement or special constitutional disturbance. It should be understood that the malignant tumors, after their inception, have a certain period of growth during which metastasis does not occur. This period may be represented by but a few weeks or by months. It is necessary, if the patient is to receive the greatest benefit from the treatment, that the diagnosis be made during this period —that is, during the first few weeks following the inception of the tumor. These periosteal sarcomata are not likely to be mistaken for fibromata, osteomata, cysts, or other benign neoplasms, in consequence of the very slow, indolent, and painless growths of the latter; but they must be differentiated if possible, and that very early, from other periosteal

affections, such as acute and chronic periostitis of pyogenic origin and periostitis of tubercular, syphilitic, and chemical origin.

Pyogenic periostitis, if acute, comes on suddenly and is accompanied by intense pain, high fever, great tenderness, and marked constitutional disturbance. The very mention of the condition would readily lead one to differentiate it from a chronic periosteal process of sarcomatous origin.

Chronic pyogenic periostitis will give a history of some chronic inflammatory process with infection, such as a carious tooth, ulceration about the gums or within the mouth, or a trauma with infection. Less frequently the process will be due to an exanthematous or rheumatoid affection. In these cases there will be localized pain, swelling, and tenderness; swelling never marked, fever slight or absent, the condition not being progressive or leading to the formation of a tumor.

Chronic tubercular periostitis is a rare affection in this situation. There will be a circumscribed, slowly progressive swelling of the periosteum, with pain and localized tenderness. Fluctuation may be present, with tubercular pus formation. In these cases, if the process be situated over the alveolar process, caries of the bone may follow. The affection never occurs in a healthy individual, but usually in one who has given other indications of tuberculosis. In the maxillary bones a syphilitic periostitis, though rare, occurs as a chronic process both in the acquired and inherited forms of syphilis. There may be a more or less circumscribed periostitis with the formation of a syphilitic node, or a syphilitic gumma may occur. There is usually a severe aching pain which is worse at night. The process is a slow chronic one, and the node when formed is oval, smooth, hard, elastic, and situated within the periosteum and upon the bone. Degeneration with softening and discharge of the gumma or node frequently takes place. The underlying bone is often primarily eroded, while the bone adjacent to the gumma becomes hypertrophied. Such a periosteal node of syphilitic origin, over the inferior maxillary bone, in a boy of twelve years, recently came under my observation.

There are some cases of chronic periostitis, especially those due to a trauma, in which new bone is formed beneath the periosteum. In these cases the new bone is simply a lamella, or splint, which is laid down beneath the periosteum. Where the symptoms and clinical course, however, are insufficient for diagnostic purposes, one should use the X ray. In the osteo-sarcomata, which are frequent in this situation, the picture will show spicules of bone, placed perpendicularly to the shaft. This is characteristic, almost pathognomonic, of this growth. Sarcomatous growths situated upon bone practically always produce more or less destruction of the underlying bone, no matter whether this bone be cancellated or compact. If the X ray shows destruction of the superficial portions of the bone, the condition is at least very suspicious and is almost certainly either sarcomatous, tuberculous, or syphilitic. When a study of the symptoms and clinical course and the use of the X ray are insufficient to establish a diagnosis, an exploratory incision should be made. This will show, in an osteo-sarcoma, a cellular mass, spicules of bone, and often areas of degeneration or hemorrhage with superficial caries. In a sarcomatous growth which does not contain bone the mass is soft, highly vascular, and cellular, with more or less erosion of the underlying bone. Often there will be perforations of periosteum and a diffused, not well circumscribed infiltration of the overlying tissues.

THE MEDULLARY SARCOMATOUS TUMORS.

These growths are of frequent occurrence. They take origin from the interior of the alveolar process and either from the osteogenetic layer of the medulla or from the tooth-socket. The symptoms will vary, a good deal depending upon the species. The giant-cell sarcoma, one of the most frequent, is a semi-benign tumor. It grows slowly,

taking a year or more to reach any considerable size, and during this time may not produce metastasis or affect the health or well-being of the individual.

Pain is usually the first symptom indicating its presence. This is not severe, and often is mistaken for an ordinary tooth-ache. The pain is caused by the growth's exerting pressure upon the overlying bone, and it increases, though it seldom becomes excessive. In a short time a slight expansion of the jaw occurs from pressure within, and then swelling is to be noticed. The overlying tooth or teeth soon become loosened, the swelling progresses, the pain increases, and the teeth are often extracted. During this period there will have been little or no fever and but slight functional disturbance.

The round and mixed-cell sarcoma taking its origin from the interior of the bone is often an extremely malignant tumor. It grows rapidly, invades and destroys the bone, reaches the periosteum or muco-periosteum, which it invades, and then infiltrates the overlying soft tissues. In these rapidly growing sarcomatous growths there is often a fever of one, two, or even three degrees, with loss of appetite and flesh. There will be weakness and other marked constitutional disturbances. As the tumor in its growth destroys the bone, the X ray will show a light area corresponding to the growth, while an incision will disclose a non-encapsulated, soft cellular mass. If the X ray does not show destruction of the bone an operation may be deferred, but if it does, an operation is imperative for differential diagnostic purposes. Malignant growths taking origin in this situation must be differentiated from neuralgia and the pain of carious teeth, from necrosis of the jaw, acute and chronic, such as pyogenic osteomyelitis, phosphorous, mercurial, arsenical, and exanthematous necrosis.

Neuralgia is easily differentiated, as the patients usually suffer neuralgic pains in other portions of the body or throughout the area of distribution of some branch of the fifth nerve. There is also an absence of swelling, loosening of the teeth, fever, and other pathologic condition within the jaws. Caries of the enamel leading to exposure of and inflammation of the dentin or pulp should not be mistaken for a growth within the bones. From my own experience I have reason, however, to know that these sarcomatous growths are often mistaken for and treated as cases of caries or necrosis of the bone. Acute diffused or circumscribed necrosis of pyogenic origin, with its sudden onset, swelling, intense pain, and fever, is not likely to lead one into error. The only processes likely to mislead, if one be at all cautious, are the cases of chronic necrosis and the benign growths taking origin within the bone.

Phosphor-necrosis, with its gradual onset as a diffused periostitis accompanied by the loosening of many teeth, with profuse suppuration and a history showing exposure to the fumes of phosphorus, will readily lead one to differentiate it from a sarcomatous growth.

Mercurial necrosis, occurring after the administration of large doses of mercury, is preceded by intense ptyalism. It comes on suddenly and is followed by marked swelling of the periosteum and gums and loosening of the teeth.

Arsenical necrosis may occur as the result of the application of arsenous acids within the cavity of a carious tooth, but in these cases the necrosis is very limited in extent and is usually confined to the alveolus of the affected tooth. The process is not followed by marked swelling. Cases of exanthematous and typhoid necrosis correspond in a measure with those of acute osteomyelitis, only that they are less abrupt in their onset and pursue a more chronic course.

A syphilitic gumma within the medulla, occurring either as the result of acquired or inherited syphilis, may lead to the gradual expansion and absorption of the bone and will be difficult of differentiation from a sarcomatous growth without a history of syphilis and without exploratory incision. A tubercular inflammation may occur in the interior of the maxillary bones as the result of the implantation of the bacillus of tuberculosis and the formation of a tuber-

cular node. The inflammation is very slowly progressive, the expansion of the bone gradual and seldom considerable. There is usually a limited area of tenderness in the overlying periosteum, often with fever and usually with a history of tuberculous processes elsewhere in the body. With central destruction of bone, the X ray picture would show a light central area the same as in sarcoma; an incision, however, would establish the diagnosis.

DIFFERENTIATION FROM BENIGN TUMORS.

The benign growths which implicate the interior of the maxillary bones are the odontomata, fibromata, osteomata, the cysts, and the benign epithelial growths. The general characteristics of the benign growths are that they usually occur in young persons, and do not for a long time produce pain, expansion of the jaw, or loosening of the teeth. They never produce metastasis nor do they affect, except as the result of pressure or infection, the health or well-being of the individual. They are also comparatively rare, being much less frequent than are the malignant tumors.

The odontomata have also the further characteristics that they are usually associated with a non-erupted tooth or teeth and are congenital in origin.

The cysts which occur in the alveolar processes have their origin from the epithelial cells which were projected from the mucous membrane in fetal life into the subjacent tissues for the purpose of producing the enamel of the teeth. These columns of sequestered cells, when they have served their purpose, usually undergo degeneration and absorption, but when the conditions are favorable, they may multiply and cause either a cystic or solid tumor, and this may be either benign or malignant. Three cases of solid epithelial tumors, two of them benign and one malignant, have been reported having their origin from these sequestered cells. One case of cystic tumor having its origin from these cells occurred in my own practice, in a boy of ten. The right side of the lower jaw became quite rapidly expanded without pain of any kind or loosening of the teeth. On incision a cyst was found as large as an English walnut. Microscopically the wall was made up of epithelial cells, resting upon a fibrous base. The age of the patient, the rate of growth, the want of constitutional effects, the X-ray pictures, and if necessary an exploratory incision disclosing a cyst or other well circumscribed growth will serve to establish the benign character of these tumors.

Endotheliomata also occur in the maxillary bones, more especially in the alveolar processes. They take their origin either from the endothelial cells lining the lymphatic vessels or from the endothelial or perithelial cells of the bloodvessels.

The so-called angeio-sarcoma is nearly always an endothelial growth which has taken origin from the cells of the bloodvessels, the first act in its formation being the sprouting of the endothelial cells of the vessels and the formation of new capillaries. The endotheliomata of bones rich in bloodvessels are at times very malignant; as a rule, however, they have a low grade of malignancy, and except at a late period do not produce metastasis or other marked constitutional disturbances. They cannot clinically be differentiated from the sarcomatous growths.

CARCINOMATOUS GROWTHS OF THE MAXILLARY BONES OR THEIR COVERINGS.

This genus is represented by three species. One of these is the epitheliomatous ulcer which may be seen upon the gums, and which has all of the characteristics of an epitheliomata in other situations. Primarily there may be an ulcer, a fissure, or a small wart. Ulceration, in any event, is soon established. The ulcer, if upon the inside of the gums, may spread to the tongue, tonsils, and soft palate; if upon the outside of the gums it is likely to spread to the cheek. It is usually circumscribed, often round, and has the hard, indurated, parchment-like base which is so characteristic of these

ulcers in other situations. It occurs in persons advanced in years. The ulcer cannot be made to heal by any of the ordinary means, and sooner or later invades the adjacent tissues and produces enlargement of the nearest lymphatic glands. The only condition with which it is likely to be mistaken is a tubercular ulcer. This, however, has not the board-like induration of its base and borders, is not so progressive, and occurs usually in individuals giving other symptoms of tuberculosis.

The second species of carcinoma is the adeno-carcinoma. This occurs in the antrum of Highmore, from the glandular structure of the mucous membrane, and produces a soft, very vascular, at times rapidly growing and very malignant tumor. The growth may in a short time fill the antrum, causing pressure upon and later destroying its walls, after which it invades the surrounding structures, implicating the lymphatic glands adjacent and producing distant metastasis. With very few exceptions the process occurs after middle life, and more frequently after fifty years of age. The growth is attended with a good deal of pain and swelling. The swelling may be limited to one wall or implicate all of the walls of the antrum.

The diagnosis is made by taking into consideration the age of the patient, the comparative rapidity of the growth, the severe pain followed by destruction of the walls of the antrum, with regional and metastatic infection. An X-ray picture will disclose destruction of the walls of the antrum, and an exploratory incision will show a soft cellular growth filling the antrum and invading the adjacent structures.

The third species is the cystic or solid carcinomatous or epitheliomatous growth which occurs within the alveolar processes from the sequestered cells of the enamel organ. But very few of these cases have thus far been reported. These were small fleshy or cystic growths within the bone or pulp-cavity. They do not seem to have been very malignant. Their diagnosis would be difficult without a microscopic examination.

Discussion.

Dr. G. V. Black, Chicago, Ill. I have seen many varieties of these tumors, and the evil results of a failure to diagnose them early. Many of the malignant tumors, if diagnosed properly and promptly, may be operated upon with almost perfect safety to the patient, whereas if the diagnosis is faulty and the proper operation is deferred, death is the almost certain result. Now, there are a number of things to be taken into consideration in the matter of diagnosis of tumors.

I remember one patient who came to me many years ago—nearly twenty—with a suspicious sore on the lip, and the case was operated on at once. The man was not long ago in this city, as well as anyone, yet the microscopic examination of that growth showed it to be true epithelioma.

In another case that I did not see so early I was called by his physician into the country to see a patient. He had not been to a dentist. He had a suspicious sore in his mouth. An operation had previously been performed, and the result was not satisfactory, and I was asked to see him. After making the examination, I was forced to tell him it was too late, that it was epithelioma and would eventually destroy his life. Not satisfied with my opinion they went to another surgeon, and he made the same prognosis—too late to do anything. Yet that patient bragged of his health, and apparently he was in good health.

So it is with these malignant tumors. In order to cope with them, we must be able to recognize them quickly, and to distinguish between the malignant and benign varieties. Malignant growths occur about the mouth oftener than in any other region of the body, and this the statistics will bear out. The irritation from the sharp edges of teeth and broken roots is one of the factors favoring the development of cancer in this region very much oftener than other causes elsewhere. The region next in importance in the number of such malignant cancers is probably the uterus, but the mouth

claims the very much larger share of victims. Lupus, as we used to call it before we knew the true bacteriological origin, also comes in for a large share of victims.

Whether these patients go to a physician, to the general surgeon, or to the dentist, it is equally necessary that the person to whom they are shown should be able to at once make a correct diagnosis.

It is not many years since I saw a specimen, where a section including a number of teeth had been resected from the mandible in a case which I found was merely a chronic alveolar abscess with a fistula opening upon the face—a condition that might have been cured by a comparatively trifling operation. This again illustrates the necessity of differentiating benign tumors from those liable to destroy life.

Dr. C. H. Oakman, Detroit, Mich. I recall the case of a man who was sent to me. After having had several teeth removed by an advertising dentist he developed distressing symptoms, resulting in his coming to my office for relief. The appearance of the patient was cachectic to a marked degree, and I was much concerned, being quite sure it was a case of epithelioma. Before determining on operation I cut out a small piece of the tissue from the affected part and had it examined by a pathologist; the report confirmed my suspicion. Two weeks after the operation had been performed and the infected part placed in the best possible condition, the antrum was filled with a growth having a cauliflower appearance, and it was necessary to curette it every ten days to two weeks, a quantity of tissue being removed each time. This condition kept recurring, and at the end of four months the patient died in agony. The whole side of the face was involved, the eyes were closed, and the neck distended far beyond the line of the face.

Another case was that of tuberculosis of the jaw in a little child nine years of age. A swelling had been there several months and but very little attention was paid to it; finally the family dentist determined to extract a molar tooth which he thought might be causing the trouble; he was unable to do so. The patient was brought to me the next day. It did not appear to me that the molar was the primary cause of the disturbance. The child's temperature was 102° F., and remained so for several days. After watching the case for four days I decided to operate. The diagnosis of tuberculosis was made through the microscope. I extracted the tooth, made an external incision above the facial artery, and thoroughly curetted the region—removing considerable bone. The case progressed favorably, the temperature soon became normal and the child gained weight rapidly. I heard six weeks ago that she had had no trouble since and was attending school regularly.

Referring to the matter of obtaining a skiagraphic picture of the antrum, as mentioned in the paper, I have never seen that done but once, and that was in the case of an edentulous jaw, and an excellent definition of the antrum was obtained. Where the teeth are in the jaw it is almost impossible to get a good picture, and the gentleman who takes skiagraphs for me has never been able to do so. I hope some of the gentlemen here may have some typical pictures with them, so that I may be able to take some information home to my X-ray friends.

Dr. Vida A. Latham, Chicago, Ill. I would like to call attention to a danger that is common. I remember having had a case some two years ago of an elderly lady who had trouble with the mandible on the left side, about the neighborhood of the lower first molar. The case had been diagnosed as one of necrosis of the jaw. There was a fistulous opening. Before it came to me through her daughter, who was a physician, she had been urged to see a general surgeon, and he operated upon her. The surgeon could not exactly determine the nature of the trouble, so he cut into the jaw-bone, curetted and scraped it. I was present during the operation, they having sent for me by her instruction, and as he could not get the first molar out, he turned around to me, and said, "Can

you get this tooth out; that is your job, not mine?" I declined to take the tooth out. He said it had to come out, and finally, after a few minutes succeeded in extracting that tooth and likewise the second molar, and then finished the curetting.

That case was operated upon at five different times, and, at the end the mandible was greatly reduced in thickness. That same patient developed later a pyonephritic abscess which finally burrowed into the abdomen and caused a considerable rise in temperature and great suffering. The case came back to me in this condition, and when I saw it I told the patient she had to undergo another operation. By that time she had a large opening under the mandible, so that the food and saliva would escape and run down her neck on her dress, a condition that was almost impossible to endure. I called in consultation Drs. Bertha E. Bush and John S. Marshall, who kindly consented to operate for the oral condition, and found instead of a necrotic bone or a malignant growth, an odontome embedded in the ascending ramus, which was removed at once, and today that patient is alive and well in California.

We must be exceedingly cautious about tumors of the jaw and their pathology. So far as I have gone into the subject, I would like to say that I know of no region of the body in which malignant or benign growths can take on so many different varieties of form. I have seen more than one tumor or neoplasm with the characteristics of four and even five different neoplasmatic varieties. What does that lead to? The surgeon will first find a small fibroid growth, and by taking a superficial cutting will discover on examination the fibers of a benign, not a malignant tumor, but if the deeper tissue be examined the characteristics of angeioma may be discovered, and if the still deeper tissue, those of a mixed form of sarcomatous carcinoma. The danger of overlooking malignancy is as great as Dr. Black has pointed out, and requires a most carefully selected section from the entire depth of a growth made in the operating room so that the surgeon and pathologist working together can verify the diagnosis made at the time of operating.

I would say from a microscopical standpoint, be very cautious about accepting a diagnosis of a non-carcinomatous growth, as many cases not carcinomatous in the beginning will develop that characteristic later.

As I said in the beginning, we may talk about confusing sarcoma with inflamed tissue, but from the point of view of clinical and microscopic pathology, I would like to know how we can positively differentiate a neoplasm from inflamed tissue.

Dr. Gilmer. We should teach dental students that one of the most important parts of their work is to thoroughly examine the entire field under their supervision. Why? Because this is a part of the body which is most subject to malignant growths, and we know that the dentist is the one that will be most likely to see them in their incipiency, when by an operation the patient's life may be saved.

Let us bring the matter home to ourselves and remember what we have heard today and also that to simply examine teeth for cavities to fill is by no means the whole duty of the dentist.

What would you think of a rhinologist who would simply look for some one particular diseased condition, or an ophthalmoscopist who would examine only one particular part of the eye and let all else go? We must become dental surgeons in the broadest sense.

All this is the more important, because the statistics show us that 85 per cent. of all pathological growths in the mouth are malignant, many of which by early recognition and removal would save the patient's life.

Regarding the X ray. I think that is a help not sufficiently employed by the oral surgeon and dentist. In the case spoken of by Dr. Latham it was perhaps a little early for the X ray to be of assistance; but if we would utilize the X ray in order to determine the condition, fewer mistakes would be made in resect-

ing the jaw for conditions not requiring it.

I will relate a case that came under my observation, which Dr. Arthur Black will remember. The patient had been suffering for a number of years with a great deal of pain at times in the region of the angle of the jaw, with an occasional swelling, and accompanied by a rise in temperature. There was no external appearance of trouble so far as could be observed. The pain was of neuralgic nature, diffused over that side of the face. The case had been examined by surgeons and by dentists, and none were able to make a satisfactory diagnosis. The patient's health was running down and she was in despair. When the patient came into my hands I brought to my assistance the X ray, and what did I find? I found in the ascending ramus an impacted third molar. I removed the tooth with considerable difficulty and the patient recovered.

Dr. G. V. Black. I will give an incident as illustrative. I was called in consultation by Dr. Prince, many years ago, concerning a young patient whom he had had under observation a few weeks in the hospital. He said there was a sore in her mouth that refused to heal. I examined the patient and found some considerable thickening of the cheek and a suppurating surface. By holding the tissues in a certain way and by having the patient close the mouth I discovered that a third molar with very sharp cusps had recently come through on the buccal side, and at every closure of the mouth it would dig into that sore. By extracting the tooth Dr. Prince cured the case.

The Chairman. I have had some experience, and have met both good and bad fortune in these cases. I remember one patient some years ago in whose case we found the original etiological factor was an unerupted tooth. The history of the case was somewhat doubtful. I had sections made, but unfortunately the microscope will not always tell us what we want, because there is a stage—which was referred to by Dr. Levings—during which the microscope will very often in sarcoma show nothing that absolutely distinguishes it from other inflammatory conditions, so we are thrown back from the microscope upon just such little clinical points as he has given out today. That happened in this case, and in a few months I learned of the patient's death from a malignant growth, after a series of operations by different surgeons.

A year ago last July I was consulted by letter concerning a patient living at a distance, who had a sore on his lip that would not heal. It was not much of a sore, and the question was referred to me as a possible clinical case for the next winter. The condition as described to me in the letter was such that I wrote, that if I undertook anything relative to it I must see it immediately, for otherwise I could have nothing to do with it. The case did not come to me in the clinic, but when the winter term came on, in the course of a few months, it was in the hands of a general surgeon, and afterwards I was called upon to help out. The patient was in an absolutely hopeless state; his entire lower lip and anterior portion of the mandible had been removed, and what remained of the tissues on either side had been drawn together by great stretching to meet in the center, with the result there was almost no jaw left and the two remaining portions of jaw-bone (the rami) were loose and flapping. He was in a condition in which life was unendurable, and worse than he would have been without the operation.

I have seen many cases of that kind—beginning in a simple way, just as that case had done—and when operated upon finally they were horribly mutilated. It seems to me to be the worst kind of brutality to perform that kind of operation when there is no prospect of a hopeful permanent result.

Dr. Patterson. Some five months ago, the wife of a physician was brought to me with a swelling on the left side of the maxilla and a large cyst in the vault of the palate, which her physician had diagnosed as antrum trouble. I was not prepared to give any attention to the case, and the case was referred to an X-ray specialist. The X ray confirmed the diagnosis previously made by the physician as disease of the antrum. A surgeon advised that the sooner the

maxilla was taken away the better for the patient. I examined the case and found all of the teeth in perfect condition save the lateral incisor, which was dark and had long been devitalized, having been the seat of disease before it had been filled some twelve years previous; but after that it had not given any great trouble, except for some swelling upon that side of the face. I looked for diagnostic signs of antrum trouble and did not find them. I advised her to have that tooth out before having an antrum operation, and I extracted the tooth. Upon extraction there came from the socket an enormous amount of pus. I opened into the cyst on the vault, and found the bone involved in the disease and all around the contiguous territory from the nose down to the vault of the palate filled with purulent matter. There was no disease of the antrum. In the examination I found no entrance to the antrum. The case was cured within two weeks after treatment.

In other cases I have been very much aided by the X-ray examination, but this experience has led me to be very cautious.

Dr. Levings. I would like to speak on one or two points. One of these is, that I appreciate the fact that this subject is clearly understood by the gentlemen composing this section and needs no elucidation. I do not think, however, that the differential diagnosis or the pathology—and I speak more especially of cases of chronic necrosis, their symptoms, and their course—is sufficiently understood by the general dentist, consequently he makes mistakes. We all make mistakes, but the general dentist makes more than he should. The objection is made that by the microscope you cannot differentiate one part of a tumor from a fibroid, another from myxoma, and another from carcinomatous growth. That may be true, and I doubt not it is true. Still I think the microscopist is not always the best clinical diagnostician. He sees only the dead specimens. If he is going to make a correct diagnosis, let it be upon the living tissue. He should have experience in foreseeing the course these cases will take, and not simply make an examination of the dead product. What we want is the living product at a time when one can be of benefit to his patient. No benefit comes to the patient by telling the friends, after he is dead, that he suffered from a fibroid or carcinomatous growth.

What we want is a diagnosis of the patient's condition based upon clinical symptoms. I believe if one considers the malignant processes intelligently, he will be able to differentiate them in nearly every case from chronic inflammatory processes. Now these malignant growths seldom, if ever, lead to pus formation, and if you have considerable pus formation you can almost always exclude malignancy. Cases of chronic periostitis and necrosis, and cases of benign growth one should exclude by the clinical symptoms. I think the principle should be, as I stated in the paper, that every growth should be considered possibly malignant until proved benign.

Operations to be of permanent benefit to the patient must remove all the growth. If then, on account of anatomical difficulties, all the growth cannot be removed, there is no occasion to operate unless the operation might relieve pain, lessen suppuration, or be done for its cosmetic effect. Remove all the growth if you possibly can. I do not think the deformity with which the patient is left should be taken into account at all. If all the growth can be removed, the deformity may at the time or subsequently be corrected in some way. Of course it is not certain that all of the diseased structures can be removed, but if it is probable, then I think we should operate.

The subject was passed, and the section adjourned until 2.30 P.M. Friday.

Fourth Day—Friday, September 2.

The section was called to order by Dr. Geo. V. I. Brown, the chairman. Dr. José J. Rojo of Mexico presided as honorary chairman.

The first paper was read by Dr. W. J.

Roe of Philadelphia, Pa., entitled: "Report of Five Cases of Ankylosis of the Temporo-Maxillary Articulation." [This paper is printed in full at page 420 of the present issue of the Cosmos.]

Discussion.

Dr. J. S. Marshall, San Francisco, Cal. The only question in my mind is whether the patient may not have recurring ankylosis. I do not remember now how long it was since the first operation was done.

Dr. Roe. The first operation was performed in December 1901, the second in February 1902.

Dr. Marshall. When did you see the first case the last time?

Dr. Roe. I heard from the first case—the patient lived in New York—and when shown at Niagara Falls, the power to separate the jaws had increased.

The second patient lives in Philadelphia. I saw him within two weeks. He can at this time open his mouth an inch and a quarter, and has good masticating power.

Dr. Marshall. That is an exceedingly gratifying result. In almost all of these cases the trouble has been in the danger of the ankylosis recurring.

Dr. B. G. Maercklein, Milwaukee, Wis. I would like to ask Dr. Roe how much of the bone was removed—just the head of the condyle, or farther down on the neck? Possibly that might have some bearing upon the results.

Dr. Roe. I would like to answer this. I make it a rule in all these cases to make a continuous chiseling through from the zygoma to the region of the condyloid fossa. I chisel away until I can pass my index finger clear, not having it impinge between the occluding surfaces; but until I can pass my finger so that it does not touch either the upper part of the ramus or the lower part of the zygoma, and not until I can pass my finger without any pressure, do I feel satisfied that I have a sufficient opening.

Dr. T. L. Gilmer, Chicago, Ill. You are also careful to remove all the periosteum?

Dr. Roe. I do not remove the periosteum; I operate from the sub-periosteal side.

Dr. Marshall. How long do you keep the packing in the wound? How long did you use the packing in this case?

Dr. Roe. The technique is explained in my previous paper. I close the mouth absolutely, bringing the force of the masseter muscle to close the fissure; I close the skin with a cuticular suture, allowing no packing, getting primary union with the least amount of cicatrical tissue, and allow the blood-clot to form. I rather wish to have a considerable degree of blood-clot to flow in there in order to keep the parts separated.

Dr. Marshall. Have any cases suppurated after the operation?

Dr. Roe. No; I have been extremely careful not to have any sort of infection.

Dr. Maercklein. I desire to speak only in connection with the last case referred to by the essayist. It is somewhat unfinished; and I mention this only because I have recently had a similar case with very unsatisfactory results. A little girl about four and one-half years of age was afflicted with diphtheria last February. The family physician took care of the child, and there seems to have been an infection which spread to the mucous membrane of the alveolar border on the left side of the mouth on both the upper and lower jaws. A sloughing of tissue took place with exfoliation of, I believe, the upper molars and the lower second temporary molar. The child was very sick, of course, from the diphtheritic infection, but eventually recovered.

Shortly afterward the fibrous connective tissue and cicatricial tissue was formed about the mandible, uniting it with the upper jaw to such an extent that only slight motion was possible. The patient, having a relative a physician living in Milwaukee, came to the city, and Dr. Kreutzer, the relative, separated the cicatricial band, with apparent immediate relief, some time last May. As the essayist has described in his paper, the bone soon reunited, and I was called

in consultation about three months afterward. The jaws had become rigidly fixed, no motion being obtainable except a slight lateral one. To the touch the band seemed to be of almost osseous density, and the upper and lower jaws appeared to be perfectly united. After administering an anesthetic, I operated, and dissected out all of this material, first dividing it in order to be able to open the mouth. After the division it was easily opened, and I could readily dissect out this hard, fibrous tissue—to such an extent that I exposed extensively the parotid gland in removing the cicatricial tissue. The healing process seemed to progress satisfactorily. We saved all the mucous membrane we possibly could, but there was a large exposure of denuded surface.

Despite all those efforts, on account of this denuding of the bones a number of points formed on the posterior edge, possibly in line with the internal pterygoid muscle; they were also removed and dissected out. For a number of weeks the success of the operation seemed to be very apparent, and when I last saw the patient, about three weeks afterward, everything had healed. The motion of the jaw was from an inch and a quarter to an inch and a half, with a little tension applied between the upper and lower front teeth.

Just before coming here, I received a telephone message from Dr. Kreutzer informing me that the same condition that we had before is again beginning to supervene—fibrous bands again re-forming—and that the motion of the jaws is almost eliminated, there being less than half an inch of separation at the present time.

I desire to report this case in connection with Dr. Roe's paper on account of the bad result ensuing, and I would be very much pleased to hear from Dr. Roe at any time in the future, and to receive any information or suggestions that anyone might possibly give in order to obviate this condition or again cure this possible secondary condition.

Dr. Roe (closing the discussion). I wish to thank the members for the interest they have taken in the paper and for their kind expressions. I have replied to the inquiries as the discussion progressed, and I shall take pleasure in communicating with Dr. Maercklein in reference to the conditions I find after I operate upon this case.

I am not undertaking this case with the same assurance that I would undertake a case of bony ankylosis. It may seem somewhat simple at the present consideration, but I fear the result much more—that is, the functional result—than I would if it were a case of bony ankylosis. I do not fear the incidental dangers consequent upon the operation in a case of fibrous ankylosis. In the last case there is a normal development of the mandible, for the woman was sixteen years old when this ankylosis occurred and there is no respiratory difficulty nor any abnormal relation of the organs which take part in the respiratory function, and should any difficulty occur during the administration of the anesthetic it would be a moment's work to cut through the fibrous tisue, bring the tongue forward, and do anything ordinarily done in respiratory difficulties under an anesthetic. But, I am not confident of the result unless I can preserve enough of the mucous membrane to close over the raw surface, and I intend to make a pressure from within and without and hold that mucous membrane in close contact with the denuded cheek surface, in order to get primary union or early union between the two surfaces and obtain the least amount of cicatricial tissue. If I can do that I feel that I shall get fairly good results, but I shall have some contraction from the inevitable formation of cicatricial tissue.

(To be continued.)

SIXTH, SEVENTH, AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

Thirty-sixth Annual Convention.

THE thirty-sixth annual union convention of the Sixth, Seventh, and Eighth District Dental Societies of the State of New York was held in the Colonial parlors of the Genesee Hotel, Buffalo, N. Y., October 25 and 26, 1904.

FIRST DAY—*Morning Session.*

The convention was called to order at 10 o'clock Tuesday morning by Dr. R. Murray, Buffalo, president of the Eighth District Society.

After the reading of the President's address by Dr. Murray,

Dr. C. F. BUNBURY, Rochester, secretary of the Seventh District Society, read the minutes of the last meeting, which were approved as read.

The next order of business as announced by the President was the reading of a paper on "Amalgam," by Dr. W. W. COON, Alfred, N. Y., an abstract of which here follows:

AMALGAM.

I have on previous occasions advocated a small percentage of gold in amalgams.

At the time copper amalgam was having full swing in this country I was making most of the alloy I used, and of course also made copper amalgam, and that I used somewhat to my sorrow, until beginning to cover its surface with alloyed amalgam.

In experimenting with the various alloy formulas I found that the addition of a small percentage of gold was an advantage; but I soon stopped making my own alloys, because with the apparatus at my command I could not be sure that the resulting alloy ingot would be uniform in its composition throughout the entire mass. I could buy alloy that was exact and add as much or little gold to it as I wished when amalgamating it. This was made the subject of a paper and clinic at one of our Eighth District meetings several years ago.

Recently I have been adding gold in a different and perhaps more satisfactory manner; that is, by using mercury in which has been dissolved a definite percentage of gold—from $\frac{1}{4}$ of 1 per cent. to 2 per cent.

To see for yourselves what is the advantage of a small amount of gold in amalgam, take a small glass phial and put in it 400 grains of mercury; add to this one grain of Watts' crystal gold, which will be quickly dissolved by a little shaking, and you have a solution of $\frac{1}{4}$ of one per cent. Add 8 grains of gold and you have a 2 per cent. solution. Four hundred grains of mercury will make many amalgam fillings.

I have never mixed my alloy and mercury by weight, but know that proper amalgamation is essential to the best result, and that proper amalgamation is to be obtained just as you would get the best results in mixing oxyphosphate cement; that is, in amalgamating, first put in the mortar all the mercury required for that mix, add but a small portion of alloy and pestle it out of sight, and gradually add other portions of alloy until the mass is the right consistence without squeezing out any of the mercury. This method reverses the more usual manner of making amalgam.

A small percentage of gold makes amalgam tougher, gives it better color, and renders it more satisfactory altogether. This manner of adding gold

insures absolutely perfect distribution in the mass.

Discussion.

Dr. F. E. Howard, Buffalo, said that the suggestion offered by Dr. Coon several years ago, of adding a certain amount of gold to the ordinary alloys, had struck him very favorably, and to a greater or less extent he had followed that practice ever since. He had been in the habit of combining a certain portion of gold with the alloy in the mix, without any regard to definite percentage, and while he had added a small percentage in some cases and larger in others, he had found that the amalgam had been materially improved by the addition of the gold. He was unable to say precisely what percentage should be added to make the alloy exactly right. He thought the addition of the gold gave additional edge strength and added very materially to the quality and also to the setting of the alloy. He felt thankful to Dr. Coon for his suggestion, and recommended the method to those who had not as yet tried it.

Dr. M. B. Straight, Buffalo, had used the method suggested by Dr. Coon, but, like Dr. Howard, without definitely measuring the amount of gold added to the mix.

Dr. C. S. Butler, Buffalo, wished to emphasize a point which to him had been very satisfactory, and which he felt was a step in advance of anything he had approached heretofore. He had been in the habit for years of using, as perhaps many others had, an alloy of a very quick-setting quality, made, as he presumed all the present amalgams were, according to the Black formula. He had found that the amalgam was so quick in its setting as to make it hardly possible to mix enough for a large contour filling at one mixing to complete the operation. In order to overcome that difficulty he had learned to mix his amalgam in sufficient quantities, as he needed it—for instance, an amount sufficient for one-third of the filling; after packing that thoroughly into the cavity, mixing another quantity, and so on, step by step, until the completion of the operation. He conceived the value of this method from observing that the greatest proportion of the change in alloys is at the beginning of the first stages of crystallization; consequently, whatever change had to take place in the amalgam would occur in the first portion of the filling. This conclusion, he thought might be all wrong scientifically, but practically he believed it to be correct.

By following this method and burnishing the filling before removing the rubber dam and completing the operation, he had practically secured the entire change in the substance of that amalgam before the latter part of the operation was completed, and he was able in this way, he thought, to get a better edge strength, a more thoroughly condensed filling, and in the end a more homogeneous mass than in those amalgams where the whole amount required for the filling was mixed at one time. He said this method was applicable to any amalgam, but more particularly to those quick-setting alloys which must be used with rapidity in order to complete the operation before the first portion has set.

Dr. G. F. Woodbury, Cleveland, Ohio, in referring to the last speaker's method of using amalgam in relays, said that he uses it in that way himself, but not for the purpose which Dr. Butler had mentioned, but to fill cavities extending under the gum margin. He fills the cervical portion of the cavity and finishes it while yet accessible. In a large filling, the cervical margin cannot be easily reached and properly finished after the filling is completed.

Dr. Wm. Jarvie, Brooklyn, N. Y., thought the proper combination and the proper use of gold in amalgams was very important, as probably throughout the country that material was used for perhaps three-fourths of all the fillings inserted. The use of gold in amalgam is not new, although perhaps its use might be so in the exact proportions used by the essayist. A number of years ago he was in the habit of doing what Dr. Howard had described; that is, adding gold to the amalgam without paying any attention

to the proportion used. He could not tell the percentage used any nearer than to gage it with the eye. He felt that it improved the alloy, but in what way he could hardly tell. He, however, has now discarded that method. A number of years ago he had had an amalgam made with three per cent. copper; that seemed to greatly improve the amalgam, but the surfaces of the fillings would discolor very much, and so he likewise discarded the copper combination. Only a few days ago a lady had been in his office with an upper bicuspid with a very large amalgam filling, the surfaces of which were perfectly black. He asked the patient how long it was since he had inserted the filling. She did not exactly remember, but thought it had been only a few years. On looking up the record of the operation he found that it had been done twenty-eight years ago. The copper combination he thought was very satisfactory in every way except that it discolored.

With regard to the addition of metals to amalgam alloys, he thought the combination of metals as received from the manufacturers are about as nearly perfect as we could possibly get them. If the dentist is careful in the preparation of the cavity and in the manipulation and finishing of the filling, amalgam fillings, so far as their saving properties are concerned, are as good in extensive cavities as anything we can use.

In regard to using amalgam in relays on account of being able to finish the cervical margin, he believed that by the use of the matrix the amalgam could be perfectly packed at the cervical margin and the operator could go right on and finish the filling and remove the matrix, and the margins in the majority of cases would not have to be touched at all. Another advantage of the matrix is where a cavity extends on two surfaces of a tooth, as with the aid of the matrix considerable pressure in packing the amalgam can be exercised. One of the most desirable things in the preparation of the amalgam he thought was thorough incorporation of the materials, and to do that sufficient mercury must be used to make the mass quite plastic, so that when pressed together between the fingers it will not crumble.

Dr. T. C. Phillips, Buffalo, said that it is a recognized fact that most manufacturers of amalgam consider that an addition of gold and platinum adds materially to the value of the amalgam. What percentage of these materials should be added is a matter of experiment. It is claimed that the addition of platinum to an alloy adds strength, makes it set quicker, and the amalgam retains its color. He thought that most of the amalgams can be improved considerably by the addition of gold and platinum.

Dr. G. H. Latham, Antwerp, N. Y., asked the essayist what amount or percentage of gold it was best to use. He considered that if the matrix be used with care and the burnishing thoroughly carried out, a very good finish at the cervical margin is obtained. To finish the filling at the cervical margin he uses linen cloth cut in strips. Very often with the matrix the surfaces of fillings are so smooth that not even the strips have to be used.

Dr. Luther Smith, Batavia, said that in his estimation the polishing of the filling is one of the most important features of the entire operation, not only for the tooth itself, but for the one next to it, provided it be an approximal filling, as unless these surfaces are polished thoroughly there will be left a granular surface which would afford lodgment spaces for the food.

Dr. E. C. Kirk, Philadelphia. The question of the addition of gold to amalgam alloys has been the subject of extensive study and investigation by Tomes, Fletcher, Hitchcock, Essig, Flagg, and Black. Tomes' published work is to be found in the *Journal of the British Dental Association;* Hitchcock's in the Dental Cosmos; Essig's in the Dental Cosmos and in the first edition of his work on Metallurgy, Flagg's in his book, and Black's in the Dental Cosmos. With reference to the percentage of gold that might be added to an amalgam alloy to benefit it, the researches of Tomes and

Fletcher stated that as the result of their experiments, not over five per cent. of gold should be added to the finished filling—that is, the finished filling should not contain more than that amount of gold.

The literature on the subject shows that nearly all the experimenters agreed that there is something in what is known as the aging of amalgam; that is, after the alloy is fresh cut, allowing it to age before use. It would be found that a test filling made from a mass of fresh-cut alloy would present certain characteristics, certain definite physical properties, such as shrinkage, expansion, etc. That same alloy allowed to age and being made into a filling would exhibit a modification of these properties, especially with reference to the shrinkage. He believes that there is a peculiar property attributable to amalgams by the manufacturers—the capacity to flow under pressure—which is affected or modified by the aging of the alloy. Professor Black had called attention to this property of amalgam, but under another name. There is another fact in the matter of alloys in general that seems to have a bearing upon this subject, namely, that all so-called base metals in a state of fusion have the property of absorbing oxygen. For example, when a base metal is fused in a crucible which is left uncovered and a test bar is made from this metal, it will be found that the tensile strength of that bar will be less by from twenty to twenty-five per cent. than that of a test bar made of this same alloy fused in the absence of air. The fractured surfaces of the bar fused without access to air, when examined under the microscope will be found to be granular in character, whereas those of the one fused in the presence of air will present a crystalline surface, showing that the volume of oxid prevents absolute molecular contact between the crystals. In the case of the metal which is fused free from the access of air, and where the absorption of the oxygen had been prevented, a perfect metallic surface will be found with a true metallic luster, showing almost complete molecular contact, thus increasing the tensile strength. It is a well-known fact that in fusing a bulky mass and one in which the particles are minutely divided, the bulky mass will not present the surface for oxidation that the minutely divided particles will. Oxidation takes place more rapidly in the latter. It is with similar conditions that we have to contend in the making of an amalgam mix.

In a large mass of alloy the oxidation and this change in the physical properties of the amalgam is due to the superficial oxidation of the fused particles, which makes the mass less homogeneous from the standpoint of molecular contact, thereby reducing its strength. It will not expand or contract as a homogeneous mass, because of the absorbed oxygen. It might be true that the introduction of metals such as gold and platinum into the mass does in some way affect it so as to prevent in a measure this oxidation. And hence the value of washing the amalgam with alcohol before inserting it, because it tends to remove this absorbed oxid.

Dr. Kirk called special attention to the importance of investigation and study along this line, because, as Dr. Jarvie had said, a vast majority of the filling operations are done with amalgam—an agent we know little about.

Dr. L. Meisburger, Buffalo, agreed with Dr. Jarvie on the question of adding different metals to the alloys as we get them from the manufacturers. We can rely on their giving us the best combinations of metals, as they have men who devote their entire time to the study of these questions, and they can certainly produce a better alloy than we could hope to do.

Dr. Coon (closing the discussion) said that he thought about two per cent. of gold should be added to the amalgam. That percentage of gold added to a copper amalgam makes a most excellent amalgam.

The old method consisted in adding the gold to the mix immediately before using it, but a better way in his opinion is that which he suggested, of dissolving the gold in the mercury, and then add-

ing the alloy to as much mercury as needed for each mix. A small quantity of alloy and mercury is first thoroughly amalgamated, then more is added until the proper quantity and consistence is obtained, without having to squeeze out more than a very small quantity of the mercury. This method is superior to the old one of adding the gold in the mix; it adds considerably to the good qualities of the amalgam.

Motion to adjourn until the afternoon session was then made and carried.

FIRST DAY—*Afternoon Session.*

The meeting was called to order at 2 o'clock by the president, Dr. Murray.

The first order of business as announced by the President was the reading of a paper on "Local Anesthesia," by Dr. F. E. HOWARD, Buffalo, which is here briefly summarized:

LOCAL ANESTHESIA: A NEW METHOD.

Dr. Howard spoke of the new method of producing local anesthesia by forcing the anesthetic into the dentinal tubuli by means of Dr. Meyer's instrument devised for that purpose. He said he had experimented with this instrument a great deal during the past month or so, and that the results secured had been highly satisfactory. The speaker then explained the technique of using the instrument, saying that the first step consists in making a small cavity in the dentin to just admit the nozzle of the instrument. The cavity is to be made in sound dentin, either in the cavity of decay or as near to it as possible. The medicament is then placed in the instrument, and forced into the dentin.

The essayist cited several cases of extremely sensitive dentin where by this method he had been enabled to prepare the cavity without any pain whatever to the patient.

Concluding his remarks, Dr. Howard said that the use of this method is practically in its experimental stage; he is convinced, however, that by an intelligent use of it very satisfactory results can be obtained in the preparation of extremely sensitive cavities.

Discussion.

Dr. F. W. LOW, Buffalo, in discussing Dr. Howard's paper, said the method had been recommended to him, but he had not had opportunity to test it sufficiently to be able to speak intelligently of the possible results to be obtained. In the several cases in which he had tried the method so far, he had only been able to produce perfect anesthesia in one case. He attributed his failures, however, to his not being familiar with the instrument and the method of applying the anesthetic. He also spoke of the difficulty he had in handling the instrument, the peculiar shape of which was not adapted to use in hands like his, the handles being so far apart that he could not easily grasp them and retain them in the required position for the necessary length of time without cramping his hands. Notwithstanding his rather indifferent success with the method, Dr. Low expressed the hope and belief that much good could be gained by this method of anesthesia.

Dr. G. F. WOODBURY, Cleveland, Ohio, in discussing the paper, said he had had very good success with the method in every case where he had obtained the proper adaptation of the instrument to the dentin. He had used it in teeth with a number of cavities, mesial, distal, and occlusal, and had been able to produce perfect anesthesia in most cases. The only objection he had to the Meyer's instrument was that it is not easily grasped by the operator.

Dr. M. L. FAY, Buffalo, said he had used the instrument to a very limited extent, but he was glad to hear the good results obtained by others. He said he had considerable trouble in applying the anesthetic, as it required the use of both hands, and the shape of the handles had tended to cramp his hands. He thought the method was good and would prove very beneficial.

Dr. WM. JARVIE, Brooklyn, thought

there is no subject before the profession today which has created as much interest as this one—the anesthetizing of sensitive dentin for the excavation of cavities. There is also nothing so much to be desired by the operator as to be able to practice painless dentistry in these cases and without danger to the pulp. The question is not so much which form of instrument is to be desired, because he was sure that if the method proved a success there would very soon be on the market improved instruments of easier manipulation. He thought there was no question that anesthesia could be produced by this method. He mentioned the fact that a great number of methods for producing anesthesia have been urged on the profession in the past few years, and that many of them have proved very disastrous in their effects. He referred to cataphoresis, saying that while this method had been very successful in producing anesthesia in the dentin, the great objection to it is the length of time required for its application.

With regard to this special method, he advised the profession to go slow in experimenting with it. The best plan, he thought, was to try it only in cases selected for the purpose, and to watch the effect very carefully to see that no deleterious results follow its use. He also spoke of the fact that experiments and investigations on this subject were now being carried on, to determine the effects on the dental pulp. These experiments were being conducted with the utmost care and upon scientific principles by the committee appointed for the purpose of investigating new methods and medicaments by the Dental Society of the State of New York.

This method has been tried in his office on a few selected cases, but he will not try it on any others for a while, as he desires to watch the results in those cases in which he has tried it. He expressed the hope that the method might prove successful and not be harmful to the dental pulp, as it would then be of great benefit to the profession.

Dr. H. L. Belcher, Buffalo, said he had met Dr. Meyer in Buffalo demonstrating the use of the instrument, and he had tried it to a limited extent in his own practice, but with only partial success. The principal trouble he had had with the method was in preventing regurgitation of the liquid—that is, not being able to confine it to the cavity—and he wished Dr. Howard would speak more definitely on the technique of how to confine the liquid to the cavity.

Dr. R. E. Luther, Batavia, asked Dr. Howard to state in closing the discussion if he had ever had any bad after-effects from the use of the anesthetic. He said he was not prepared to offer any argument on the subject, but it had occurred to him that, the pulp tissue differing from other tissues of the body, it would probably not return to its normal condition as well as would any other part of the body when placed under anesthesia.

Dr. J. W. Beach, Buffalo, expressed the same sentiment toward this method of anesthesia of the dentin as Dr. Jarvie. He thought it would be best to go a little slow in the use of it until we were more certain regarding its after-effects. He thought, however, that the death of one or two pulps would not prove that the method was bad, as it is better, he contends, to lose a pulp occasionally and still get the good effects of the method in the many cases where it is so much needed.

Dr. Howard (closing the discussion) said, in answer to the query as to the best method of obtaining a cavity in which the fluid would be easily retained, that we must have a water-tight joint in order to make the application properly and force the anesthetic into the dentinal tubuli. In order to do this, he said, considerable practice was needed. He followed the method of selecting a bur to correspond with the size of the point of the instrument, and with some practice he had been able to confine the fluid to the cavity.

With regard to the amount of anesthetic applied, he said he had never thought it advisable to have more than three or four drops in the syringe. This amount was not forced into the

tooth, but it was best to have that quantity in the syringe. It was not advisable to have the syringe full, as that placed the handles so far apart that they were inconvenient to manage; however, with two or three drops of the anesthetic in the syringe the handles were not too far apart to handle conveniently.

With regard to bad effects from the use of this method, he said he had experienced none so far, and that he felt very much encouraged, as he could produce thorough anesthesia and prepare cavities painlessly which heretofore he was unable to do.

(To be continued.)

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

Special Meeting, November 7, 1904.

(Continued from page 392.)

THE reading of Dr. R. OTTOLENGUI'S paper, "A Contribution to the Study of Sterilization, with Especial Reference to the Work of the Dentist," gave rise to the following

Discussion.

Dr. Louis Faugères Bishop and Dr. Chas. B. Fitzpatrick of New York city were invited to open the discussion.

Dr. LOUIS FAUGÈRES BISHOP. We have a clinical laboratory in the building where Dr. Fossume, chairman of your Executive Committee, has his office, and he came up and asked us if we would discuss a paper on germs in the mouth, as he put it. We consented to do so. I am not a practical bacteriologist; my end of the work is the clinical end. Dr. Fitzpatrick, who is present, is the bacteriologist. However, from the point of view of a general medical practitioner, a man who sees a great many very sick people in hospitals and other places, the infections of the mouth and through the mouth have always been of great interest and importance to me. This paper is entirely too technical for me to enter into, but from a general point of view of the treatment of infected mouths I was very much interested in the conversation I had with Dr. Fossume the other day. I see many cases of mercurial salivation. You know when a person has defective kidneys, and he be given mercury, he very easily becomes salivated. Thus a great many of the bad kidney cases that come to the hospitals have become salivated. They are nasty, troublesome cases, too, and I think we handle them very badly. Dr. Fossume suggested that they should be treated more in detail. We give them mouth-washes and various things, but his suggestion that each tooth should be cleaned up, and each foul area cleaned and sterilized, struck me as being very practical.

I wish we had dentists in the general hospitals; I think we ought to have them. I am sure dentists would be willing, particularly the younger ones, to give their time to charitable work, as physicians do, and it would be a very great charity indeed if some young dentists would offer their time and skill to sterilize the terribly infected mouths of these salivated people. That may be departing from the subject, but it is the nearest I can come to it.

The question of the danger and the harm done to people by infection through the mouth is an interesting one. As to the danger—it requires two things to produce disease by inoculation. One is the presence of the infectious material, and the other is the susceptibility of the individual—that is, the absence of resistance on the part of the individual. That is illustrated very finely in tuberculosis. For a great many years I have

had to do with consumptive wards, and nurses and doctors working in them, and I have never felt that I was in any particular danger, nor have I felt that the doctors and nurses were. The reason is, I believe, that most people most of the time are practically immune to any slight infection of the tuberculosis germ, and the chances of such people being susceptible at that particular time are pretty small. Of course we take precautions so that they shall not become badly inoculated.

With the mouth it is the same way. Most healthy people a great part of the time are in a condition where a slight infection can be thrown off and resisted. We hear a great deal of talk about the cure of typhoid fever, pneumonia, etc. All the discussion and all the study only affects a small percentage of the patients. Take pneumonia—the cases that I see in Lincoln Hospital. Twenty per cent. of them are absolutely hopeless. They are people who have contracted pneumonia at the end of a spree, who have not eaten anything for days, and are picked up in some dark tenement in an ambulance and brought to us. There is another 50 per cent., perhaps, who are only slightly ill with pneumonia—have a pneumonic patch in the lung, a slight fever, and they get well; but our treatment has nothing to do with it. Our treatment and our precaution has to do only with a small percentage—perhaps in 10 per cent. of the whole number the outcome of the disease is influenced by treatment. The application to this subject is this: that it is a work of conscience. We study this question of sterilization because it is going to influence a small percentage of our cases. Most dentists get on most of the time without any sterilization at all, and they will often for a long time have no accidents; but once in a while there will be some condition present where the health of the individual, and certainly his comfort and happiness for a great while, will depend upon sterilization.

There is one practical point that I might mention, and that is as to absolute alcohol. When I was house physician in St. Luke's Hospital we had a great many cases of pleurisy with effusion—so many that it was always convenient to carry an aspirating needle to put in the chest and test for fluid. For a year or so I carried an aspirating needle in absolute alcohol, and relied on that for sterility; and I never had any accidents. That was a clinical test on human beings. It seemed to show that absolute alcohol at least made the germs so intoxicated that they did not do any harm.

We expect to take up in our laboratory a study of the saliva in order to devise routine methods of examination, much as is now done with the urine.

Dr. Chas. B. Fitzpatrick. This apparatus appears to me to be the result of a real stroke of genius. The only thing I would suggest is that if a little weight were placed on the top of it, complete sterilization of the contents could be effected. In other words, if you attempt to sterilize anything by steam without pressure you do not kill off the spores. In the laboratory, in making media we often expose the things on one day to steam without pressure, then we give them twenty-four hours to germinate or develop, and expose them again in the same way; and then the day after that we expose them again. Thus we destroy the organisms in the form of the germs and in the form of the spores. The spores are very difficult to kill. They develop into germs after the full-grown forms have been killed by the first sterilization.

A very common form of instrument which boils under pressure is used in the boarding-houses for boiling or digesting bones in the manufacture of soups. If you use an instrument like this new apparatus an unequal area is exposed to the steam. If something is placed on top to hold the steam in we have what is known as flowing-steam sterilization under pressure, which is the most effective form of sterilization. An exposure of about twenty minutes and a pressure of fifteen pounds are required.

We have in this new apparatus a good idea which can be perfected.

I have a few words to say on the sub-

ject in general. Relative to what has been said upon the use of chemicals and drugs to sterilize and also to digest or disintegrate the pulp, I should think if carbolic acid were employed instead of sulfuric acid it would cause the pulp to be digested or disintegrated. It is a first-class disinfectant and its action is limited.

Relative to mouth infections: If, for example, a dentist performs some of those delicate operations on the teeth and gums and an unsterilized instrument is inserted which has been in the mouth of a syphilitic patient, it may very well be forty-five days before the symptoms arise which were due to an infection arising from the living virus which was upon that instrument. We do not know what the organism or virus is that causes syphilis, and we do not know exactly what kills it. The only thing to do is to make some sweeping reform such as this, namely, to sterilize every instrument that goes into an open wound or causes a wound in the mouth.

I have been very much interested in the statements about caries and its microbic origin. If it be due to a specific micro-organism, which is left on the instrument, there is a fair probability that it can, under favorable circumstances, be carried from one patient to another. In actual practice the polishing instrument does not strike the tooth alone—it never has in my mouth! I do not know how many quarts of blood I spit up, but I did spit up a good quantity from that instrument striking something besides the tooth! Now, micro-organisms will grow upon that blood and the abraded surface, and if they are virulent, pathogenic germs they cause disease, which can be transmitted and which has all the elements favorable for transmission in the mouth, especially in a mouth which is not very clean and where there are decayed teeth.

I have been much interested in the subject of cleansing the mouth. I undertook some years ago to find out in how many mouths the pneumococcus was present. Surgeon-General Sternberg maintained that it was present in almost every mouth, and we actually found it in about 90 per cent. Some years ago I also undertook to find out under what conditions the mouth could be cleaned. I found that if the mouth was washed out with mild antiseptics and the teeth thoroughly cleansed for a week at a time, it became free from the presence of the pneumococcus and practically aseptic, and remained so for three or four days. In extracting a tooth, or even cleaning a tooth, a wound is left in the mouth, and everything in the mouth that is not sterile may infect the wound. The mouth should not only be cleansed in the area of the operation, but it should be cleansed as a whole.

I also want to bring up the question of cancer in the mouth. There has been much inquiry as to the transfer of this disease from mouths which have not been properly disinfected. Instruments which have touched cancer should always be sterilized, and inasmuch as most of you are not medical men and do not know cancer when you see it, I think it would be a good thing to take aseptic and antiseptic precautions and see that the mouths are kept sterile before, during, and after an operation.

The more we study latent diseases, especially those of the neck, head, and lymphatic system, the more we become convinced that many of those diseases obtain their entrance through the mouth. Their virus is brought by the lymphatics to the glands of the neck or throat. If the system is strong enough, it overcomes the disease; but if not, the germ finds lodgment and begins a disease which may spread all through the system. This is particularly true of tuberculosis. The bacillus which we know to be the cause of tuberculosis has been found in the mouth, although that person in whose mouth it is found may not be suffering from tuberculosis in any form. You can understand that if there is a lesion made in that mouth and the organism is there, you have provided for an entrance of the germ into the system. The same with diphtheria. The bacteria of diphtheria are found in the mouths of many healthy people. The organism is usually harm-

less to the healthy man harboring it because it is not virulent to him or because he may be used to it. Put that organism into the mouth of a person who is not well or who has an open septic wound in the mouth, and it will probably infect him. What the exact nature of the germ-life is which occurs in pyorrhea and the different forms of necrosis, especially the forms where the antrum is affected, has not yet been fully worked out. Pathology and bacteriology have not as yet elucidated this field. There is much unknown about the organisms present in these affections, and for us to be able to say with certainty that we have sterilized completely would require the use of the most thorough methods of disinfection and sterilization.

Professor Miller of Berlin, whom you probably all know, lays great stress upon the number of bacteria and the different organisms which are found in decayed teeth in disease conditions of the mouth and caries. From a bacteriological standpoint these conditions of the mouth offer the best media possible for them to attain a high state of virulence.

In order to thoroughly disinfect the material which we obtain from these pulps, and the instruments employed, it seems to me we have hit upon a very good thing in the use of steam, especially if you get what is called flowing steam and if it be contained in some sort of vessel under pressure in which you can get it to circulate and penetrate the material needing disinfection.

Dr. F. L. Fossume. We are certainly indebted to Dr. Ottolengui. He has done wonderfully well in the short time at his disposal to prepare this ingenious little apparatus and give us a paper treating the subject in such an instructive manner.

As to the practical aseptic treatment of root-canals, I have had the most satisfactory results from the use of formalin —that is, 40 per cent. aqueous solution of formaldehyd gas. I do not boil the root-canal instruments immediately before each operation, but after using them I regularly pursue the following method: The instruments are first mechanically cleansed by brushing thoroughly with aseptic soap and water and then boiled. I then place them in a glass cabinet ready for use. As before mentioned, formalin is my stand-by in root treatment, and of course the instrument must pass through this fluid on entering the canal, which is in itself a disinfecting process, as the fluid, which necessarily partly fills the root by capillary attraction, is itself a powerful germicide. By leaving the solution in the root-canal for some time, and passing the broach back and forth—spreading the fluid to the roots and scraping downward —the condition is such that all débris may be thoroughly syringed out.

In the extirpation of live pulps by pressure anesthesia I have scarcely had a pericementitis or any untoward symptoms afterward. This is a great boon, as formerly I had considerable inflammation and soreness.

Dr. Hatch. Does the formalin cause pain at the time?

Dr. Fossume. I do not usually employ the 40 per cent. solution of formaldehyd until the cocain has taken effect; but I have put it on freshly-exposed pulps and sealed it there without having had any pain. If, however, the pulp be inflamed and supersensitive it always causes pain—at least this has been my experience.

Dr. M. L. Rhein. There is no subject that is more interesting to us than the one we have had presented this evening. I find myself in a rather embarrassing position. Dr. Ottolengui is a very good friend of mine, and I am sorry he has wasted so much good money on this apparatus, because I can see no practical use in it for the purpose intended.

There have been a number of things said by Dr. Bishop about infection and asepsis that should interest every dentist, for they have been most admirably expressed by him. The number of cases where aseptic intervention is necessary is limited in dentistry; but it is impossible for us to accurately determine those cases, and hence it is necessary to practice asepsis as closely as possible in all cases.

I want to bring up one point that I have not heard clearly stated, and that is, that perfect asepsis is impossible. In no surgical operating room that I have ever been in has it been carried out. There is no surgeon in this country who carries out perfect asepsis, and all we can do is to use precautions as far as lie in our power.

It seems necessary in discussing this subject to bring in the *ego* and be personal. Dr. Ottolengui and I have had many discussions on this subject, and he knows pretty well my opinions. The removal of a live pulp and any possible danger of infection is dependent entirely on the methods of the operator, his cleanliness or uncleanliness, and what is most important—a point which perhaps Dr. Fitzpatrick has overlooked—the absolute removal of every part of the pulp tissue. When you leave pulp tissue in the pulp-canals, while it may not show the results of infection directly, it is liable to infection twenty years afterward, under proper conditions, through the circulatory medium. We have numerous statistics in dentistry demonstrating this fact; so that the whole technique of root treatment must be carried out as perfectly as possible in order to insure freedom from possible infection afterward. I do not say that this is always possible, but it is possible in a great many cases where it is not now carried out by reason of the hurried work of the operator.

In order to obtain any sort of aseptic conditions, surgical cleanliness is an absolute necessity. That means a thorough cleansing of the instruments prior to any form of sterilization, and the citation by the essayist of the wiping of an instrument with a cloth, and then still being able to infect a medium that has not sufficient resistance, is a demonstration of the fact that the simple wiping of that instrument is not cleansing it in the proper sense of the word. If an instrument be carefully scraped and polished before it is boiled nothing need be feared, nor is there any necessity for following out such a system as Dr. Fitzpatrick suggests—of boiling and re-boiling—because we have nothing but the pure steel which we place in our covered sterilizer.

Dr. Fitzpatrick very pertinently answered one of the points of the essayist when he spoke of the slipping of an instrument. Dr. Ottolengui spoke of the rubber dam being over the tooth, but he did not state what percentage of dentists use the rubber dam for this purpose. Dr. Fitzpatrick mentioned, as I said, the possibility of an instrument slipping and penetrating through the rubber dam and thus wounding the soft tissues.

The remarks about mercurialization were especially interesting to me because I have had occasion to handle such cases quite frequently, especially in diabetic patients, to whom mercury is often administered at stated intervals for years. The physician should not carry his treatment with mercury to the point of mercurialization, and there is only one way that he can determine this point. A diabetic patient while under treatment should necessarily be under the care of a dentist as well, and receive dental attention at such frequent intervals that not only does the dentist keep the teeth polished, but may also apprise the physician of the first premonitory symptoms of mercurial poisoning as they appear to his trained eye, which would detect them much more readily than would the general physician.

However, the main point of contention with the essayist is this, that the instrument used in the root-canal may be sterile at the time it is brought there, but in its very passage through the air the instrument is liable to carry infection into the root-canal. The condition of the operator's hands is also important. The method pursued by myself for about twenty years has been to depend upon sterilization taking place in the root-canal after the canals have been absolutely cleansed of all organic tissue. In other words, supposing we had every particle of pulp tissue thoroughly removed, we then use what I have advocated for years—the sodium-potassium*

* Kalium-Natrium (Schreier).

combination—which will digest small particles of organic tissue that remain clinging to the ends of the canaliculi of the dentin. Having reached this stage, we syringe out the root-canal with a solution of mercury bichlorid, which is perhaps the only perfect germicide that we possess, and the solution that I have used for years for this purpose leaves a slight residue of the mercuric chlorid around the inner periphery of the root. I have often demonstrated this, the result being due to the solution containing a small amount of acid; consequently we get the precipitate.

We now have our root-canals in an absolutely sterile condition, and the only danger is that in introducing the filling material we may carry an infected material through the end of the root—not only the instrument, but the very filling material we use may become infected. In order to avoid this, I sterilize my filling materials in a formalin solution before they are introduced into the canals. I have an assistant at the chair who holds in one hand a small phial of alcohol with a wide, open top, and in the other hand an alcohol lamp. After the instruments are polished and cleaned, and before they are passed into the canal, I pass the instrument into the alcohol, then into the flame of the lamp, which ignites the alcohol, and we get not only the benefit of the alcohol but also of the heat, and that will destroy any bacteria which may adhere to it in its passage.

I cite this method of sterilization of root-canals with a great deal of confidence, because my records on this subject have been very satisfactory to me, and I consider it a far easier method than the placing of this apparatus on the operating table. Faithful following of its details will convince anyone of its clinical superiority. No method of sterilization can show successful results if each step be not thoroughly carried out.

Dr. H. C. Ferris, Brooklyn. I think Dr. Ottolengui has a very unique little appliance there; the manner in which he controls the solution to prevent it from boiling out is novel. But I must agree with Dr. Rhein that it seems impracticable, inasmuch as it takes at least ten minutes—as we are told by all our scientists and bacteriologists—to accomplish any sterilization at all.

It might be of interest for me to explain a method I carry out which seems to me to save time, and is very simple. In the matter of sterilizing broaches—and I sterilize the steel broaches—they need not necessarily be gold or platinum—I use small homeopathic phials, put the broaches in them, and place them in the sterilizing apparatus for about ten minutes. At the end of ten or fifteen minutes I fill the phials with a saturated solution of sodium carbonate and cork them with rubber stoppers. They are laid away in the cabinet. When I remove a pulp that has first been sterilized by an application of 40 per cent. formaldehyd hermetically sealed for forty-eight hours in the cavity, without producing any pressure on the putrescent pulp, I consider that my root-canal and pulp are practically aseptic, owing to the action of the formalin gas that has been generated from the application. Then I take from the bottle one of the broaches that has been previously sterilized, and remove any solid matter that remains in the root-canal; but the method of sterilization is done aside and away from the chair. I do not have to wait ten minutes every time I want to sterilize a broach. If I use a second broach I take another bottle. It is a very simple matter to have a dozen of these bottles laid out on the tray.

Dr. Fitzpatrick says it takes three sterilizations to accomplish a perfect result. If that be the case we can sterilize our bottle three separate times, and thereby accomplish a perfect sterilization; but I have always considered that ten minutes' boiling was quite ample to accomplish a thorough sterilization.

Dr. John I. Hart. We may approach asepsis, but we cannot accomplish it completely; yet anything that tends in that direction should receive our hearty indorsement. Personally I have found that the steamer made by the Electro-Therapeutic Co. of Philadelphia, in which the broaches are held and steril-

ized under steam pressure, as has been suggested by Dr. Fitzpatrick, has accomplished fair results. I deem this a preferable method to the excellent instrument shown by Dr. Ottolengui; but I am not ridiculing his by any means, and I think if I had not the satisfactory method of sterilizing that I now use, I would use this one. I do not agree with the doctor that the broaches ought to be placed in there with the pulps on.

Dr. Ottolengui. In practice I do not do that, of course; it was merely done to show you that the pulp tissue would be removed in that way.

Dr. Hart. The advantage of using the gold broach is that it can be passed through the flame and cleansed in that way without further sterilizing. I think the gold broaches which I have used for the last three years deteriorate less by heating than do the steel broaches by sterilizing in some such media as has been suggested. Any paper of this kind which tends toward more complete asepsis is certainly to be supported.

Dr. S. L. Goldsmith. The society ought to feel very grateful for any paper which is brought before it on any subject pertaining to asepsis. I think the stage has been reached when discussion ought not to be necessary to show the need of asepsis. If it can be proved that in a thousand cases of infection even one only was caused by an infected instrument, it would prove the need for sterilizing the instruments in every case. There are many methods which could be adopted in the dental office which would bring a condition of asepsis closer. I think Dr. Bishop said asepsis is to a great extent a matter of conscience, and I agree with him; even the placing of a fresh cover on a glass operating table for each patient is done by few. In this connection I suggested a few years ago the use of white paper. How many use the same cover on their tables all day!

I have been hoping to have a cabinet made with glass drawers—the cabinet to contain a formalin lamp to keep the already sterilized instruments sterile. The aseptic dental office, while a necessity, I fear is some distance off.

Dr. Rhein. I do not want to leave the impression that I wish to cast any slur on this very ingenious instrument presented by Dr. Ottolengui. On the contrary, I think his exposition of the subject has been as delightful as all the other things we have heard from him.

In regard to keeping instruments sterile after they have been sterilized, I have for some time been experimenting in the line of keeping such instruments in formaldehyd in some form, and am uncertain whether the tablets themselves are not sufficiently powerful to answer that purpose instead of using the liquid solution, formalin. Formalin does not have a deleterious effect on steel instruments, as far as I am able to determine. It is an excellent medium to keep them free from further infection after they have been sterilized.

Dr. F. J. McLaren. We have heard it claimed that a cat has nine lives. I am glad to know a microbe has but three, and that if we boil three times the microbe is destroyed. Considering how remote the chance is of abrading the soft tissues with excavators—only one chance in a thousand—and considering that we boil our instruments between patients, it strikes me that with an appliance such as the essayist has shown there is hardly any danger of infection. I have used a sterilizer very similar to the essayist's with a great deal of satisfaction.

Dr. W. D. Tracy. I do not think I can add anything to the scientific value of this essay, but I have been very much interested in observing Dr. Ottolengui's scheme for sterilization. The diversity of opinion expressed here shows that it is all according to the point of view.

To this day I treat my root-canals with hydronaphthol in alcoholic solution, as I used to do, and dry them out with old-fashioned hot root-driers; but for a long time I boiled my broaches, and more recently I used the sterilizer Dr. Stanton gave the profession, and I feel that my instruments are practically sterilized.

Some men will work for years at a time and have good success without taking any precautions; another man will

work with all the methods of sterilization he knows and be very careful, and yet have many failures. I think that all we can do is to aim toward the acme of perfection, and every little help of this kind ought to receive our support.

Dr. B. C. Nash. With the limited knowledge that our patients have of the time that is necessary for the sterilization of instruments, I think one of the chief attractions of this appliance of Dr. Ottolengui would be in the fact that it would impress the patient with the idea that sterilization was going on, and whether it was complete or not it would satisfy that idea. I feel that I myself would like to have one of those instruments in plain sight of the patient.

Dr. Hatch. Would not an alkaline solution—such as caustic potash, for instance—which would not corrode the instruments in the office as those fumes surely will, digest the animal matter there and answer the purpose just as well?

Dr. Ottolengui. Dr. Rhein expressed sympathy with me for my wasting money in this sterilizer. Well, his remark saved me some money, as I had been thinking of sending him one!

I want to answer what Dr. Hart misunderstood. I certainly would not advise placing the broaches uncleansed in the sterilizer. I have been under some little disadvantage in showing this, because I have not had time to know very much about it myself; but when we were making the original little cups I took a broach, dropped it into the sterilizer with the pulp on it, and the pulp tissue disappeared so rapidly that it was rather impressive.

There is a side of this question that was touched on by Dr. Nash: Asepsis has been talked about so much that a great many patients now exact it, and many are exceedingly skeptical about your assertions that your instruments are sterilized. You cannot take them through your laboratory and show them your elaborate boilers, etc., and I think any appliance like this on the stand will be a satisfaction to the patient.

I am going to be perfectly honest; I am going to use this, and if I find no advantage in it I shall not hesitate to come here and say so; but if I do find an advantage in it, and you are short an essayist next year, I will come around and tell you about it.

Dr. Rhein's remarks also reminded me of the story of a man who had a clock he was very proud of. It had been in his home for about twenty years, and he said he never missed winding it every night. A friend whom he was telling about it examined the clock one day and said to him, "My, my! what time you have wasted—it is an eight-day clock!" Dr. Rhein says the instruments can be infected in their passage through the air, and he therefore dips each in the alcohol and then passes it through a flame. My, my! what time he has wasted! That method does not sterilize at all!

Dr. Hatch. I found some years ago that a solution of sodium dioxid would eat off impacted pulp tissue from a broach in almost no time, so that it was clean as a whistle.

Dr. Ottolengui. I had an experience with that material which prejudiced me somewhat against it. Dr. Sanger of Orange gave me a bottle of it one day; I put it in my pocket and went home. When I reached home I found we had company to dinner; I took off my coat, threw it on the lounge, and thought no more about it; but I had to buy a new coat and a new lounge, so I know it has very penetrating qualities!

A vote of thanks was tendered to Dr. Ottolengui and the distinguished gentlemen who took part in the discussion.

Adjourned.

C. B. Nash, *Secretary.*

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EDITORIAL DEPARTMENT.

MANUAL TRAINING AND ETHICS.

BESIDES reading the DENTAL COSMOS as a matter of business routine, the Editor thereof not infrequently reads it for intellectual stimulus, and on these occasions finds pleasure and profit in his reading just as, it is hoped and believed, the average subscriber does. Such an occasion has been furnished by the thoughtful and suggestive paper of Dr. Lindstrom in this issue, on "Manual Training as Conducive to the Highest Form of Dental Education." Much has been written upon manual training, not only in relation to education in general but as an important factor in dental education as well. The subject is not new, the utility of the method has been well tried and its value has been demonstrated as an educational means, yet, strange to say, it is still necessary to explain, as Dr. Lindstrom has done, that manual training is not essentially a training of the hand, but rather a training of the brain by means of the perceptive faculties.

In view of the years that have been devoted to the practical development of the manual training idea in education it is somewhat remarkable that the broader conception of the manual training principle should be so imperfectly grasped and by so relatively limited a number of those who are concerned with educational matters. Reiteration of the truth seems, however, to be necessary, and Dr. Lindstrom's article clearly sets

forth this broader view of the manual training idea, and fully illustrates the superior value of manual training methods as compared with purely intellectual cultural methods when these latter are exclusively used as an educational system.

There is, however, an aspect of the manual training idea which is of prime importance to its educational value, one which is rarely given its due weight of consideration, and that is its character-forming power. No end aimed at in education is of greater importance than that of developing character—that attitude of right-mindedness with respect to the relationships of life which alone makes life worth the living. How many characters are warped, and the lives of their possessors rendered obnoxious to themselves and those related to them, simply from the lack of a just recognition of the equitable relations of *meum* and *tuum!*—lives self-centered, avaricious, narrow, selfishly exacting, egoistic, because they have no just conception of the balance which social conditions are everywhere and inevitably striking as between the units of the social organization. An education which does not tend to relieve the individual of the incubus of selfishness with its outgrowths of grasping greed, selfish ambition, the determination to succeed regardless of the natural rights of others, is a flat failure—nay, worse, it is a positive harm; for, as knowledge is power, so this acquirement of knowledge which we call education is to the characterless possessor of it simply an added instrument with which he may do greater harm.

But all this is an ethical question, and what has the manual training idea to do with ethics? We believe it has as great value as a character-builder as it has as an educator of mind or of manipulative skill, when intelligently applied and directed with reference to ethical ends. The manual training idea is education by experience, by actual contact with things, not education through the imagination stimulated by words representing others' ideas of things. It is therefore direct, and is mentally impressive in proportion to its directness. The most elementary manual training exercises are capable of developing the ethical sense. A student given the problem of accurately shaping a geometrical figure in wood very quickly acquires respect for the factors of precision and accuracy in the performance of his task, and the impression is correspondingly deepened when the task is repeated or when he is required to solve the same problem in a more resistant material—cast iron, for example. He quickly discovers by experience what is meant by accuracy of angle and perfection of surface, and when his task is successfully accomplished he learns, perhaps for the first time, the pleasure of creating something perfect of its kind. The knowledge thus acquired has been gained by the expenditure of something intellectually tangible. It has cost a degree

of concentration and effort which can be realized and measured in terms of sensation, and the result therefore has a value to the student which he can personally and definitely realize. With elemental studies in precision and accuracy producing a just appreciation of the relations of given magnitudes as a basis, the ethical result is in time a respect for honesty and accuracy as elements of character.

What matters it if in the beginning the student should place an excessive valuation upon the product of his efforts? The thing done is after all best measured by its worth to him in terms of the new-born respect and admiration for accuracy, truth, and precision which he has actually materialized; and who can determine the value of these elements to the growing man into whose character they have been woven by any process whatever, even by the means here under consideration? It is, then, not the thing produced by the hand, but its reflex product in mind and upon developing character, which in this case is to be valued.

Or, if it be considered in respect to other factors of character-making, the manual method has still other possibilities. The effort to create results intrinsically beautiful engenders in consequence respect and admiration for the beautiful and harmonious, with a corresponding dislike for their antitheses. The discordant note in form and color becomes as offensive as the discordant sound, and the habit of mind toward the physical expression of these factors quickly extends its general attitude until the ethical sense is modified and controlled by the same type of standards.

The manual method, therefore, because of its power to inculcate a love of the beautiful and harmonious as well as of precision and accuracy, may, by intelligent direction, be made a potent influence in the creation of higher ideals as the standards of living.

Students of the manual training idea as an educational motive have found by practical experience that no plan of education has had such an uplifting moral effect upon children of the lowest stratum of society as education of the brain through the medium of the perceptive faculties as distinguished from the purely didactic method. It is the insufficiency, or better perhaps the inefficiency, of the older classic methods of child-training which generally characterizes our so-called preparatory system that is in no small degree responsible for the under-developed ethical sense with which teachers in dentistry have to contend in the training of practitioners. The cry is frequently heard in our professional ranks that the schools should teach ethics and there would be less of quackery. It should be borne in mind that the ethical sense is more or less definitely formed before the student enters the professional school. The training in ethics must begin in the kindergarten and primary school; it must have the continuous influence of the home in its development, and must be continued throughout the

preparatory period. Lacking this background, the giving of a few lectures upon dental ethics is time wasted; no student can understand dental ethics if he has no ethical sense to which to appeal. Much can be done, however, by laboratory drill. It matters little what the character of the subject—chemistry, histology, prosthetic dentistry, or operative technique—all of the laboratory work in any of these branches may be made to serve the ends of ethical training if precision and honesty in its performance be insisted upon. There is no such thing as a "scant inch" or a "full inch," a "little more" or a "little less," in the workshops of Nature. She strikes her balances down to the uttermost molecule and totally disregards our emotions, our likes and dislikes, in the performance of her objective ends.

Let laboratory instruction be so directed that the inevitable precision of the Master Workman may be fully realized by the student, and when the habit is formed its reflex in ethical growth will be realized. When the ethical sense has thus been awakened, a didactic presentation of the precepts and philosophy of dental ethics could be given with reasonable hope of its utility, but not before. The student who has been directed in his work by a teacher capable of developing in him something more than a desire to pass examinations, and who has utilized the resources of the laboratory for the inculcation not only of facts and technique but for imparting the stimulus to the ethical sense as well, has had the most practical instructor in ethics, and one whose students will not fail to do him the honor he deserves.

A Correction: Dr. Cryer's Stereoscopic Radiograms.

In the paper read by Dr. Cryer before Section I of the Fourth International Dental Congress, entitled "Some Uses of the Roentgen Rays in Studies of the Internal Anatomy of the Face," which appeared in the issue of the Cosmos for January 1905, the descriptions of two of the illustrations—stereoscopic radiograms representing vertical views of a skull from the vertex and the base respectively—are transposed. As will be observed on examining the radiograms with the stereoscope, the view given on page 10 is from the vertex, and the view on page 11 from the base.—Ed. Cosmos.

BIBLIOGRAPHICAL.

A COMPEND OF MEDICAL LATIN: DESIGNED EXPRESSLY FOR ELEMENTARY TRAINING OF MEDICAL STUDENTS. By W. T. ST. CLAIR, A.M., Professor of the Latin Language and Literature at the Male High School of Louisville, Ky., etc. Second Edition, revised. Philadelphia. P. Blakiston's Son & Co., 1904.

The student who enters upon the study of medicine or dentistry without a fair knowledge of the Latin language meets invariably with untold difficulties in so far as memorizing the thousand-and-one terms pertaining to the subjects of their respective curricula. A large proportion of these terms are of Latin derivation, and each has a distinct meaning descriptive of the structure or condition it designates. Without a clear understanding of their significance the memorizing of these terms is, as a rule, a fruitless task. If accomplished, however—a feat of mental gymnastics in view of this Latin deficiency—the knowledge thus gained is seldom lasting, as shortly after examination it vanishes into an indistinct recollection of meaningless names with a pseudo-Latin sound.

In the reviewer's experience students with a reasonable degree of familiarity with the dead languages are certainly more successful in the study of such subjects as anatomy, physiology, pharmacology, etc., than those without this familiarity, and while we appreciate, of course, that other requisites are equally and in many respects more important, yet it is, we believe, an undeniable fact that a good reading knowledge of those languages is a most helpful aid in this connection.

Toward the acquirement of the rudiments of Latin in its bearing upon medical terminology and prescription-writing the book before us will be a most helpful aid to the medical, dental, and veterinary student. It contains innumerable data on the etymology of medical words, together with an array of comprehensive suggestions on the art of prescribing drugs, and is in every way what the author states it to be—a plain and practical presentation of the fundamentals upon which medical language is built.

J. E.

REVIEW OF CURRENT DENTAL LITERATURE.

Conducted by JULIO ENDELMAN, D.D.S.

[*Münchener medicinische Wochenschrift*, October 1904.]

BACTERIOLOGY OF NOMA. By A. Hofman and E. Küster.

The authors (*Medical News*) have succeeded in isolating a specific and hitherto undescribed bacterium from the tissues of a case of noma. If the necrotic tissues be examined a great variety of germs, including staphylococci and streptococci and diphtheria bacilli, may be detected, but in the deeper structures, where inflammation is just beginning, only a short, slightly curved bacillus is found. This grows well on all culture media, but is not identical with others previously isolated in noma. The spirillum grows best in the presence of oxygen, is Gram-negative, and forms long chains. It may also be stained directly in the tissues, but here appears more like a bacillus.

[*l'Odontologie*, Paris, February 15, 1905.]

SECONDARY LOCALIZATION OF LUPUS. By Dr. V. Chilé.

The author (*Russki Journal*) has observed that lupus begins ordinarily upon those parts of the body ordinarily exposed, particularly the face, but that the secondary localization is very frequently upon the gums. In thirty out of a series of fifty patients the disease eventually became localized upon the gums.

[*Zubovratch Vestnik*, June 1904.]

A TOOTH IN THE NASAL CAVITY. By Dr. Schweiburg.

The author was consulted by a woman forty-six years of age regarding a violent headache from which she had been suffering almost uninterruptedly for at least twenty years. The only teeth which remained—the lower incisors and the upper right lateral and central incisors—were seemingly in perfect condition, but there were present in the mouth, apart from the above-named sound teeth, a number of carious roots. At the level of the external wall of the right naris, the mucous membrane was elevated and inflamed, its thinness exposing a white grayish body, very hard and brittle. An attempt at removal, however, was followed by such a profuse hemorrhage that the right nasal cavity was tightly packed and the operation deferred until the following day. The second attempt was successful, the tooth being removed under cocain anesthesia.

It was 18 mm. long, curved at the apex, and was covered all around by a thin lamella of bone, corresponding to the alveolus in a normally erupted tooth. The crown was cylindrical. It was not possible to determine whether the tooth was a supernumerary or whether it was one of the regular set deviated from its normal direction of eruption into the nose.

After operation the headache disappeared.

[*La Stomatologia*, Milan, January 1905.]

TONSILLAR ACTINOMYCOSIS. By Dr. Thevenot.

That the tonsil may constitute in certain cases the portal of entry to infective material is today a well-established fact. The cases of actinomycosis on record are comparatively rare. The one described by the author is particularly interesting in view of the fact that the patient's teeth were free from caries, and the appearance of the mouth altogether healthy up to the appearance of the infectious process around the mandible. The man in question was admitted to the hospital for the treatment of an attack of purulent tonsillitis. Shortly after his recovery, the tissues over the mandible began to swell, and became bluish and painful. The form of the swelling was irregular, and in the course of a few days fluctuation became noticeable. An exploring puncture was made, and in the liquid thus

obtained were discovered, under the microscope, a number of actinomyces and other forms of vegetable parasites. It was not possible to determine definitely the origin of the infection, but the supposition is that the mandibular disorder was consequent upon the tonsillar infection, which may have been due, at least partly, to the ray fungus.

[*Archives de Stomatologie*, Paris, June 1904.]

A CASE OF SALIVARY LITHIASIS OF THE SUBMAXILLARY AND SUBLINGUAL GLANDS REQUIRING THE COMPLETE EXTIRPATION OF BOTH GLANDS. By Dr. A. Perrone, of the University of Naples.

The author describes the interesting investigations of Professor Berger, of the University of Paris, on the patho-histology of lithiasis of the salivary glands. This author found that in cases of calcareous deposits within glandular tissue the parenchyma of the organ undergoes sclerotic degeneration, the process taking place through the agency of lymphatic cells, and the resulting changes having the characteristics of an infectious neoplasm. Berger is of the opinion that the calcareous deposition is followed by an infectious process. He recommends that in advanced cases the affected gland be completely extirpated, inasmuch as the sclerotic changes render the organ absolutely powerless to carry out its physiological function.

Dr. Perrone then describes the case of a man aged sixty, who was admitted to the Hôpital de la Pitié suffering from a tumor in the right submaxillary region, beneath the tongue. It gave rise to acute pain, and interfered with both deglutition and phonation. At the age of fifteen he had noticed a small swelling in the submaxillary region. It grew larger in a comparatively short time, and became eventually of such size as to cause a great deal of pain and annoyance, again interfering with mastication and speech. An operation was performed, and a calcareous deposit the size of a large pea was removed from Wharton's duct. The disturbance, with all its concomitant symptoms, recurred within two years, when a second operation was performed and a calculus of similar size to the first was removed. Since that time pain would reappear at different intervals, and cease only after the spontaneous expulsion of a number of small calculi. Shortly before his visit to the hospital the whole cycle of phenomena had reappeared, but this time of such an intensity that the patient was rather discouraged, and upon the surgeon's advice decided to submit himself to a radical operation. The entire submaxillary region was tumefied. Wharton's duct could not be explored throughout its length, owing to the presence of a number of calculi. The submaxillary gland, indurated and sclerotic, was firmly attached to the surrounding tissues, and had been evidently the seat of chronic suppurative inflammation. In view of this it was decided to extirpate the submaxillary and sublingual glands, likewise sclerotic and atrophied, together with their excretory ducts. The operation was successfully performed. The post-operative treatment consisted in frequent lavages with hydrogen dioxid solutions. The patient had entirely recovered inside of twenty days. An examination of the extirpated tissues confirmed the diagnosis. Wharton's duct was literally filled with calcareous deposits. The gland had been the seat of a number of abscesses, and a bacteriological examination of a drop of the purulent matter there found revealed the presence of a streptococcus, which when inoculated under the skin of a guinea-pig at once resulted in the formation of subcutaneous abscesses, without inducing any symptoms of general toxemia. The histological examination showed a marked dilatation of the excretory canal, sclerotic degeneration of the intra-lobular connective tissue, and complete atrophy of the glandular parenchyma. The sclerotic degeneration is due, in the opinion of the author, not to the obstruction of the canals, but to an infectious process, as has already been demonstrated by Albarran, Strauss, and Garmont, in the case of renal lithiasis.

[*Lancet*, London, February 11, 1905.]

CARBONIC ACID AS A FACTOR IN THE GENESIS OF THE GOUTY STATE. By Donald F. Shearer, M.D., F.R.C.S.

Under the term "gout" it is usual to group together gout, arterio-sclerosis, and chronic interstitial nephritis. It is commonly attributed to the over-production or to the retention of uric acid or its salts within the body. It is known that these pathological conditions follow a long-continued excess in diet, and also

upon deficient muscular activity. Lead poisoning has likewise a definite relationship with the gouty state. One fact common to all the antecedents of gout is a tendency to the production or retention of carbonic acid in the blood. The cardinal feature of muscular exertion is the large increase in the output of carbonic acid without affecting the nitrogenous excreta. Alcohol and carbohydrates can only produce, as the end products of their combustion, water and carbonic acid. The nitrogenous diet will increase the metabolism, not only of proteid, but also of carbohydrates and hydrocarbons, thus leading to an increased amount of carbon dioxid.

The treatment of gout has always for its purpose the diminution or the elimination of these waste products. The normal daily excretion of carbonic acid is 800 gm., corresponding closely to the amount which the oxidation of typical normal diets would yield. A man doing hard work will excrete a greater amount, say about 1200 gm., and in order to maintain his weight will have to consume food of corresponding weight and quantity. If we supply such a quantity of food without permitting the muscular activity necessary to excrete it, the man will either not assimilate it or will convert it into fat, or will metabolize it and excrete it as carbonic acid. We know that only a very small part of it is converted into fat, and therefore we are compelled to the conclusion that he does excrete it as carbonic acid. In the absence of muscular activity, which would naturally increase the rapidity of the pulse and the frequency and depth of respiration and therefore the quantity of blood exposed to aeration, the exchange of carbonic acid with the air must be greater than normal.*

In all cases we find that muscular activity and excessive discharge of carbonic acid go together, and we are forced to the conclusion that the gouty individual who on an excessive diet produces an increased quantity of carbonic acid which is not removed by the direct cardiac and pulmonary effects of exercise, must rid himself of it by means of an increased carbonic acid tension of the blood.

Regarding the effects of carbonic acid in the blood, the author states that it increases the activity of the vaso-constrictor center, thus leading to a general contraction of the small arteries. The heightened blood pressure thus produced is increased by the direct irritative action of venous blood on the muscular coats of the arterioles, and by the increased peripheral resistance which occurs within the capillary area. A frequent repetition of this phenomenon would inevitably produce hypertrophy of the muscular coats. The analogy of lead, a marked vaso-constrictor, which is admittedly a cause of gout, and of adrenalin, which has recently been made to account for the production of arterio-sclerosis, shows that there is no need to further discuss this point. The blood pressure consequent upon the excessive production of carbonic acid is sufficient to account for the muscular hypertrophy. If we assume that carbonic acid in excess in arterial blood acts as an irritant, as it evidently must, we can see how it would induce an excess of fibrous tissue development in the outer coats of the arteries and in the stroma of the kidney.

The action of alcohol on the liver is quite analogous. Its irritative effect is expended, not on the cellular elements, but on the supporting structure in which the venous channels run. It is not possible to show conclusively that carbonic acid possesses an inhibitory function upon the renal secretion, but there are examples on record which go to show that this is so in general, and particularly in regard to the increase of uric acid. We can show from experience that the excess of carbonic acid will produce a high-tension pulse followed by certain well-marked symptoms of intoxication, *i.e* headache, vomiting, and partial suppression of renal secretion, and that as recovery takes place it is accompanied by a soft pulse and return of cutaneous heat, *i.e.* vaso-dilatation instead of constriction, and accompanied by profuse diuresis and uratic elimination.

Concluding, the author states that the unnatural excess of carbonic acid in the arterial blood must be regarded as a most potent factor in bringing about those changes which go to make up the gouty state.

*[The statement that "in the absence of muscular activity . . . the exchange of carbonic acid with the air must be greater than normal" is doubtless due to a clerical error, as the exchange of carbonic acid with air in the absence of muscular activity is less, not greater than normal. This is prominently brought out throughout the paper.—Ed.]

[*Medical News*, New York, February 4, 1905.]

PSAMMOMA OF THE MAXILLARY SINUS.

By Dr. John C. Munro, Boston, Mass.

Ziegler describes psammoma as "sarcoma or fibro-sarcoma of the dura, inner meninges, or pineal gland, which contain concretions of lime in greater or less abundance. Some of these concretions are similar in structure to the normal brain sand, the basis of their formation being a concentric mass of cells which have undergone hyaline degeneration. They usually form round nodules, and may be of multiple occurrence." Virchow ascribes them to irritation or chronic inflammation. From the group of sarcomata he has separated this form of tumor and has classified it under the name of psammoma, as it belongs to the connective tissue type of growth. Biegel has limited the term psammoma to tumors in which there is slow growth with scarcely any tendency to multiply, and standing between the fibromata and the solid spindle-cell sarcomata. In the carcinomata, including as well endotheliomata, deposits of lime salts are not infrequently found, mainly as concretion-like masses, just as in psammoma.

The author then describes a case of a patient, female, aged twenty, with the following history: For seven years prior to 1902 she had noticed that the left eye was a little more prominent than the right. Year by year this had become more marked until at the time of her visit to Dr. Allen Greenwood it had become so prominent that it was a source of annoyance as a result of its disfigurement. At no time had there been any pain, and the vision of the eye had not been interfered with. The left eye was markedly proptosed, so that the lids could be closed with difficulty only. The eye could not be pushed directly backward, but could be pushed a little upward and then backward.

Palpation revealed a smooth rounded mass in the lower part of the orbit, beginning at the infra-orbital ridge and running upward and backward as far as the eye would allow the finger to go.

In consultation with Dr. J. C. Munro it was decided to perform an exploratory operation, as originally suggested by Krönlein for exposing the orbit. Part of the outer wall of the orbit was removed, when a large cyst-like tumor was encountered, full of reddish granular material, feeling like a mixture of sand and putty. This was curetted out in large quantity, and lay for the most part below and behind the globe, evidently having been pushed up from the antrum, the bony plate felt behind the orbital ridge before the operation proving to be the orbital floor forced upward like a trap-door by the invading growth. A further opening was then made through the mouth into the antrum, which was found filled with the same gritty material that had been found in the orbit. The orbital floor was put back into place, and was then packed with iodoform gauze. In replacing the bone flap of the orbit the deep fascia was sutured with catgut, and the skin closed with buried silkworm-gut. No shock followed the operation.

Convalescence was not as satisfactory as had been anticipated. The pulse and temperature kept steadily above normal, and in spite of persistent irrigation a discharge kept up, and the exophthalmos did not subside satisfactorily. The patient was in bed most of the time. She finally consented to a second operation with the view of removing the maxilla if necessary, as it did not seem unlikely that the growth was becoming malignant, if it had not been so from the beginning. Two months after the first operation the patient was again etherized. The left common carotid was closed with a Crile clamp, and the opening in the antrum was enlarged for exploration. It was found free of growth. As, on examination with the finger, fulness posterior to the maxilla was found, an incision was made along the side of the nose and through the upper lip in order to turn the cheek back. The anterior wall of the maxilla was removed up to the infra-orbital foramen. A hard tumor could be felt in the roof of the pharynx, pushing the mucous membrane downward, apparently having taken its origin from the antrum. This tumor proved to be psammomatous, exactly similar to that found at the first operation. On removing the pharyngeal portion more growth was found in the sphenoidal and ethmoidal cells of both sides and surrounding the left lateral wall of the nasal cavity, which was removed. The vomer had been pushed far to the right, but had not been involved in the growth. While the tumor lay on the upper surface of the palate, the latter appeared normal, and did

not require to be removed. So far as could be ascertained all of the abnormal growth was removed. Exploration into the cavity of the orbit showed no sign of recurrence in any region. The resulting extensive cavity was packed with gauze, and the wound closed with silkworm-gut and horsehair.

The patient rapidly convalesced, and was discharged in good condition after a few weeks.

Microscopic examination of the growth showed that it was a psammoma of peculiar type, which should be classed possibly as sarcoma. The calcareous bodies were separated and the nodules varied in shape, averaging 50 to 70 mm. in size. They were in such close contact that the areas of tissue between them were very narrow. Examination of the patient in September, 1904, sixteen months after the first operation, showed that the anterior wall of the upper jaw had re-formed, so that this part of the face appeared normal. There was no evidence of return of the growth, but the result of restoration of the globe to its normal position was a disappointment.

PERISCOPE.

Sodium Bicarbonate in Prophylaxis.—In my opinion, the cleanest, the easiest, the safest, the simplest and cheapest method of keeping the oral cavity clean, preserving the integrity of the gum tissue, removing inflammation of all the buccal surfaces and the mucous membrane lining them, is by the use of sodium bicarbonate alone. Use as a wash in the strength of a teaspoonful of the bicarbonate to an ordinary glass of tepid water, three or four times a day if possible.—Benj. Luckey, *Items of Interest.*

Death from a Third Molar.—A case of the death of a young man from blood poisoning set up by one of his own teeth, is reported from Châlons-sur-Saône. M. Guillemin, the man in question, had, reports the doctor who made the post-mortem examination, a third molar which was very late in making its appearance. The tooth was not decayed, but in piercing the gum had lacerated it, and set up a gangrene and inflammation, which was the direct cause of death.—*Brit. Jour. of Dental Science.*

Imitation Gold Fillings on Porcelain Teeth and Facings.—Dr. William Gardner, Edinburgh, Scotland, suggests the following method of imitating gold fillings in porcelain teeth and facings. It is done by attaching a thin piece of pure gold on the porcelain tooth or facing by means of a small quantity of low-fusing enamel fused in the furnace. The piece of gold should be of the exact form which the filling in that position would have. After the fusing the small metallic surface is polished, and when finished it will accurately imitate the filling made by the ordinary method.

Tooth-Powder.—A good formula for a tooth-powder is the following:

℞—Precipitated chalk,	500.0	gm.
Menthol,	0.5	"
Oil of eucalyptus,	0.5	cc.
Oil of wintergreen or cassia,	4.0	"
Saccharin,	1.0	gm.
Powdered Castile soap,	4.0	"

Mix the menthol and the oils before adding the other ingredients. Color with carmine, 2 gm. to 500 gm. chalk, if a pink color be desired. Put up in regular tooth-powder style. —*Bulletin of Pharmacy.*

Is Dental Disease more Prevalent in Women?—The investigation of the records of some 31,863 extractions reveals the fact that about 77 per cent. were for women and 23 per cent. for men—a difference of 54 per cent. The examination of our records made since locating in the city shows the ratio to be about seven teeth for women to three for men, or a difference of 40 per cent. Thus we find that, when all branches of the dental art are considered, woman demands from 22 per cent. to 57 per cent. more of our work than man; or, to be more explicit, taking the general average we find that woman demands about 33⅓ per cent. more attention at our hands than does man.—W. G. Ebersole, *Pacific Dental Gazette.*

Carbolic Acid Poisoning.—Chas. V. Burke, in *New York and Phila. Med. Journal*, states

that Epsom and Glauber salts are of no value as antidotes in carbolic acid poisoning. He regards alcohol as of great value, and if given promptly and followed by lavage, it will save life. The stomach tube should be fairly stiff, as some force is required to introduce it, as the mucous membrane is roughened and dry on account of the caustic effect of the acid. The swallowing reflexes are also abolished, and there is more or less spasm present. A weak alcoholic solution should be used for the washing. He therefore recommends whiskey in as large quantities as can be borne, introduced by the stomach, hypodermically, and by the rectum.—*Medico-Chirurgical Journal.*

Hemophilia.—Dr. Losser has made an interesting report on a family of bleeders in which this condition could be traced through four generations. Among 207 members of this family there were 37 hemophilics, all of the male sex; that is, one-third of the male members were bleeders. The most common signs of this condition were hemorrhages under the skin due to blows, falls, or over-exertion, as well as epistaxis, hemoptysis, and hematuria. Almost half of these hemophilics died, usually during infancy, while the tendency to hemorrhages diminished as they grew older. The fact that there were no bleeders among the female members conforms with the law that the disease is transmitted through the women who themselves, however, escape. In the case of hemophilic males who marry women of healthy family, the disease is not transmitted to the offspring.

In regard to the causes of hemophilia our knowledge is not yet complete. The view that the blood is poor in fibrin is erroneous, for it behaves toward styptics just as does the blood of healthy people. The application of iron chlorid, and especially of the cautery at a red heat, will arrest the bleeding, but the slightest touch removes the clot. In those frequent cases of wounds of the lips, tongue, and gum the crusts are usually easily removed by sucking and licking, with recurrence of the hemorrhage, and subsequent death through the anemia. If possible, after the application of the cautery a firm dressing of dry aseptic gauze should be applied.—*Internat. Journ. of Surgery.*

The Teeth a Cause of General Pathological Conditions.—A child twenty-two months old was sick ten days. It was restless and fretful, with temperature rising irregularly from 101° to 104° F. As a cause, almost every possible thing had been considered—typhoid fever, malaria, etc. At last the child's movements drew attention to the ears, and mastoiditis was suggested. I was asked to see the little one, and went over the case very carefully from several standpoints. I found no tenderness over the mastoids, no discharge from the ears, but the drum membranes were reddened and slightly bulging—would probably have ruptured within forty-eight hours. On inspecting the mouth the cause of all the trouble was quite apparent. The points of four canines were just barely through, and four molars were well advanced. As the father and mother were both physicians, and as in a similar case to which I had been called in consultation a few weeks previously, I had been told by the attending physician that such symptoms could not be caused by difficult dentition, I hesitated to say that in my opinion the teeth were the cause of all the trouble. So thoroughly convinced was I, however, that I gave voice to the opinion, and suggested a thorough lancing of all the gums, the giving a free laxative, and bromid and gelsemium to quiet the nervous system. There was no nonsense about those parents, and they insisted upon immediate action. About a week later I learned by telephone that the child was all right, it having at once begun to improve. Some months later the mother thanked me very cordially for my diagnosis and treatment. She informed me that teeth were playing a very important part in her diagnoses in pathological conditions of children.—Kate W. Baldwin, *Dental Brief.*

Antiquity of the Tooth-Brush.—"The tooth-brush, like gunpowder and printing," said an antiquary of Chicago, "originated in China. The odd little book that I hold in my hand is a translation of 'Precepts for the Fair,' a work that appeared in China in the year 272 B.C., and in 'Precepts for the Fair' occurs this passage:

'Prepare, little maid,
For your beneficent mistress
The instruments of the toilet.
Prepare her wash-bowl of blue porcelain,
Her towel of yellow wool,
The tooth-brush of green jade,
And the tooth-powder whiter than snow.
Then, after she is cleansed and perfumed,
Make reverently the morning salutation.'

"So long ago," said the antiquary, "did the tooth-brush exist in China. The first trace of it in the West does not appear till the year 1742. Up to that time (think of it!) the beauties of the past—Guinevere, Queen Mary, Godiva—had no knowledge of the tooth-brush or its functions. An American girl, Sally Annis, makes, in a letter to her sister,

the first reference to the tooth-brush that we whites possess."

From his catalogue the antiquary read the following passage of Miss Annis's letter:

"Besides these, and ye smalle combe, my father brt. me from his voyage a new mouth-brush made of eyvory; the back parte inlayd very pretty with silver; and ye Brissles long and stiffe and set very firme: wch he is Assured will helpe me of my ToothAkes; wch you will guesse deer Judy I do pray it may, and if indeed it doe, will Prize it more than all, even the redd flour'd silke; for no silke of anie collor that I know of is Becoming to a swell'd Face: not to consider oi the Payn."—*Exchange.*

A Plea for Mechanical Therapeutics.—Too often it is the custom to begin the treatment (if the abscess have fistula discharging on the gum) by forcing some solution through the tooth and out at the fistulous opening. This operation may be all right when the right time comes; but that time is certainly not until the pulp-chamber and canals have been thoroughly cleaned mechanically, and as thoroughly sterilized therapeutically. As the cause of the abscess originally was the passage of infective material through the apical foramen of the tooth, it seems obvious that it is criminal carelessness to spread the distress by forcing any more irritant material into the already highly irritated area. Again, consider for a moment the numerous treatments for that bugbear of dentistry, pyorrhea alveolaris. There is scarcely a drug in the pharmacopeia, from sulfuric acid to castor oil, that has not, at some time, by someone, been touted as a specific for this condition. Why is it that occasionally, and very occasionally, is a man found who is even fairly successful in combating these pericemental degenerations? I say without hesitation that it is because it is only occasionally that a man is sufficiently skilful, and sufficiently willing to give the time and care necessary to the surgical and operative measures necessary. If every particle of irritant and foreign matter were removed from about the tooth, more than seventy per cent. of the cases of so-called pyorrhea would get well of themselves, with no other therapeutic treatment than an alkaline mouth-wash. I do not wish to be understood as decrying the use of medicinal agents. We all recognize their absolute necessity in our practice. It is the dependence on such means to the neglect of surgical procedures that I would deplore. Successful practice means careful and thorough manipulation, and no amount of therapeutic treatment can supplant it or take its place.—F. G. WORTHLEY, *Western Dental Journal.*

Wholesome Breath of Flowers.—The old notion still holds among many people of this and other lands that flowers are not wholesome in a sleeping-room, says a writer in *Leslie's Weekly.* Certain plants, among which are the geranium, the lily, and the begonia, are supposed for some unexplained cause to give off at night an odor especially obnoxious. Scientific knowledge and numerous experiments have repeatedly disposed of these delusions, and it is a great pity that people should deprive themselves of the pleasure and satisfaction to be derived from flowers for reasons which are not reasons at all. It is true there are a few tropical plants which give off a perfume unhealthful to breathe at any time, but these plants are rare. The green leaves of all flowers are, on the other hand, most beneficial, since they purify the air. Even the doctors are beginning to recognize that they may aid in the cure of disease, and a hospital in New York has a flower ward which is used for the treatment of suitable cases.

Suppose one is confined to one's bedroom with a bad cold, an attack of influenza, bronchitis, or even with consumption, one cannot do better than surround oneself with pots of any kind of plants that have a profusion of green leaves. Geraniums are the least valuable in this respect, and strong-smelling flowers, like musk, should be avoided. How the leaves act as therapeutic agents is easily explained. What renders the air of a room stuffy and unwholesome is the carbonic acid we breathe forth. Green leaves, however, breathe it in, consume the carbonic acid, and exhale pure oxygen. Moreover, they give off in vapor the water taken up by the roots, and thus act the part of a bronchitis kettle. Consequently the patient is refreshed, and, provided there is a sufficiency of plants, exhilarated. Even people in health would do well to give this pleasant cure a trial, especially during the months when so much time is spent indoors and ventilation is at its worst. They would find themselves suffering less ennui, fewer headaches, fewer colds, and would also better resist the attack of serious lung diseases.—*New York Medical Times.*

Preparation of Gold Inlays.—Prepare the cavity so that the matrix will draw, having all margins slightly beveled; take a piece of 1/2000 platinum of liberal dimensions, press well into cavity with wet cotton pellets, pass a thin burnisher between the approximal

walls, remove the cotton, then the matrix, and trim the surplus platinum, leaving a liberal amount overlapping the margins. It makes no difference if the platinum breaks, except at the margins; in that case, place a small piece over the break and replace the matrix in the cavity; if an approximal one, adjust some suitable matrix to give contour and aid in easy manipulation. Then pack the cavity with Watts gold, preferably brick form, using care at the margins, and as the gold is packed in it forces the platinum matrix to place. Do not pack tightly, using care not to fill quite to the masticating surface. Saliva will not affect the working of the gold. It is the packing of the crystal gold that prevents contraction. To remove filling use two explorers. Embed them well, one in the approximal surface, and one in the crown; withdraw the filling steadily. The object of the two explorers is to prevent rocking and bending of any borders. Paint the platinum with a thin coat of rouge moistened with alcohol, place the filling on the soldering block, and flow 22-k. solder, using a large brush flame. If the gold be packed right it will suck up the solder like a sponge does water, and there will be considerable shrinkage of the gold; if, on the other hand, the gold retains its form, the solder will not be absorbed and the filling will not be dense. Keep adding solder until the right contour is obtained, using care that there is a coat of solder over all exposed surfaces. This will obviate any tendency to porosity of the surface of the filling caused by over-condensation of the Watts gold. Wash the rouge off with ammonia or alcohol, trim up the filling roughly on lathe, roughen the surface for cementing with fine jeweler's saw and burs. Put in cavity, and drive to place with wooden stick. Finish in or out of the mouth. If you follow these directions, the result will be a perfect gold inlay of excellent color. After the cavity is prepared it will take from five minutes for a simple cavity, to not exceeding thirty minutes for a compound one that would take a skilled operator hours to insert were foil used.—John S. Batchelor, *Dental Review.*

Making of the Matrix for Inlays.—The materials used for matrices for porcelain inlay work are gold and platinum. Gold is used for the so-called low-fusing and platinum for the high-fusing bodies. Having the cavity properly prepared, and using gold for the matrix, take a piece of the foil prepared for the purpose (No. 30), large enough to generously overlap the edges of the cavity, trim the edge corresponding to the cervical border of the cavity to an oval, and turn it over at a right angle sufficiently narrow to allow of admission between the teeth. Slide the gold to place, and with small pieces of soft spunk, using blunt-pointed pliers, gently and carefully work down to the bottom of the cavity, avoiding a puncture if possible. Continue to add pieces of spunk, working toward the walls until nearly full; then take small pieces of chamois skin, and with them under the burnisher work the gold over the edges of the cavity, making a well-defined margin.

Having satisfied yourself that you cannot improve the matrix, gently pick out the spunk, holding the matrix in position, and in its place pack gum camphor until full; this maintains the shape of the matrix and facilitates its withdrawal. The dislodgment is a very particular part of the work, and must be done with great care and nicety. At some point gently insert a fine instrument under the edge of metal, and if the matrix does not jump out, try another point opposite; if this is not effectual, you may rest assured the cavity is undercut, and must be remedied. The matrix being dislodged gently, coax it from between the teeth. Now make a batter of fine asbestos powder in water and work a little of it in the crevice made by the edge of the cavity; fill the tray with the mixture and lay the matrix in it, gently jarring until the investment creeps up over the edges. Dry out gradually and burn out the camphor, when the body may be built in.

When platinum is used, the metal is one one-thousandth of an inch in thickness and is manipulated in very much the same manner as gold, except that more vigorous treatment is used around the edges on account of the harsher nature of the material. The instruments submitted to your examination are very useful for defining the edges. Inasmuch as an investment is not used, the same care to avoid a puncture is not necessary. In adding the body, do not more than half fill the matrix; with a pin or other fine instrument make one or more cross sections through the body to prevent change of shape of matrix; bring to a biscuit in the furnace, by which process all the shrinkage takes place; return to the cavity after trimming surplus platinum off, and holding steadily with one hand; with the other carefully go over the edges with the proper instruments, burnishing closely to the margins. For small inlays one or more bakings will do; for large ones several bakings are required.—A. J. Husband, *Dominion Dental Journal.*

HINTS, QUERIES, AND COMMENTS.

DIRECTIONS FOR MAKING AN INCISOR GOLD PORCELAIN-FACED CROWN.

Proceed as in making a full gold crown, soldering the crown with 22-k. gold solder. Leave the polishing until the crown is completed. Now select a plate tooth of correct shade and slightly smaller than the tooth to be crowned. Grind the facing from the pin side to a very thin veneer, and well beyond where the pins are embedded in the facing. Now with pure gold No. 30 gage back the facing as if the pins were intact, allowing the backing to extend well up over the edges of the labial surface of the porcelain facing, and being sure that no edge of porcelain is exposed. (See Fig. 2.) Having thus prepared the facing, the next step is to prepare the crown for reception of the porcelain facing, as shown in Fig. 1. First cut away the labial surface of the gold crown as for an open-faced crown, being careful to cut the opening of the exact size to snugly admit the porcelain facing. Now place the facing in

Fig. 1. Fig. 2. Fig. 3.



the opening well down until the labial surfaces are flush with each other. Now unite the gold crown to the gold-backed porcelain with 20-k. solder, allowing the solder to flow well up on the overlapped backing of the facing. Then with a disk cut away from sight as much gold as is consistent with strength; then polish and finish. (See Fig. 3.)—T. O. McCallie, Knoxville, Tenn.

OBITUARY.

DR. BEN A. McGEE.

Died, at his residence in Denver, Col., January 15, 1905, from heart failure, Ben Abe McGee, D.D.S., in his fifty-fourth year.

The following obituary notice of Dr. McGee, who was elected president of the Colorado State Dental Association at its last annual meeting, was prepared by a committee appointed for that purpose at a special meeting of the association:

Dr. Ben Abe McGee departed this life, at his residence in Denver, Colorado, January 15, 1905, of heart failure.

He was born at Bloomington, Indiana, July 26, 1851. After completing the course in the public schools, he graduated from the University of Indiana. He entered the practice of dentistry in his home town in 1875. He attended one course of lectures in the Ohio College of Dental Surgery, Cincinnati, Ohio, after which he located at Rockport. Two years later he returned to Bloomington, where he engaged in the practice of his profession until 1894. In the fall of 1886 he returned to the Ohio College of Dental Surgery, where he completed the course, graduating in 1887. He removed to Colorado in 1894, locating in Salida for a short time and then in Denver, where he remained in active practice to the day of his death.

He was married to Miss Alice Norman in Louisville, Kentucky, in 1872. He is survived by his wife, one daughter, and one son, Dr. Rea P. McGee, who was associated with him in the practice of dentistry. Three months prior to his decease he was subjected to a deep bereavement in the death of his eldest son, Norman McGee, from which he never fully recovered.

He served the state of Colorado for six years as a member of the Board of Dental

Examiners. He was president of the Colorado State Dental Association at the time of his death; was an ex-member of the Indiana State Dental Association, honorary member of the Kentucky State Dental Association, ex-member of the National Dental Association, and an active member of the Denver Dental Association.

His early life to mature manhood was passed in the great educational center of Indiana, which seemed to exert a decided influence upon his life; so much so that he became an enthusiast upon the subject of education. His cherished conviction was that every boy and girl should receive a liberal education, both for their own protection and benefit and for the good of society; he believed that education should be the common inheritance of all.

The dental profession has lost in Dr. McGee a valued member; one who had no secrets in dentistry; a kind and genial friend. Although we bow with humble reverence to God's all-wise decree and dispensation, we cannot but feel deeply grieved by the sudden taking away, in the bloom of his usefulness, of one who was an honor to his state and profession. As long as we love our profession, as long as devotion and loyalty to it exist, so long will the memory of our brother abide in the heart of the members of our association. Though he be dead, the fame of Dr. Ben A. McGee is secure. To the wife, daughter, and son, who bear the heavier cross and the full measure of sorrow, we offer our deepest sympathy, our kindest solace.

FERNANDO H. SUTHERLAND,
EUGENE R. WARNER,
WILLIAM A. RAYMOND,
Committee.

DR. ROBERT A. WASSON.

DIED, at his home in Ottawa, Kans., February 26, 1905, from Bright's disease following an attack of la grippe, Dr. ROBERT A. WASSON, in his fifty-third year.

Dr. Wasson was born October 20, 1852, in Howell, Mich., and was the seventh son of a family of nine boys. His father and mother are still living at the advanced ages of eighty-five and eighty-three respectively. He went to Ottawa when twenty-one years of age, and three years later entered the dental office of his brother, Dr. L. C. Wasson, who subsequently removed to Topeka. After two years spent in the study of his profession with his brother, he began the practice of dentistry in Ottawa in May 1878.

Dr. Wasson was thoroughly conversant with all of the details of his art, and was universally regarded as a skilful and conscientious practitioner. He was an indefatigable worker, and to that fact more than anything else has been attributed the physical breakdown which ultimately led to his death. It is said by his physician that "For fifteen years, during his active practice, he averaged sixteen hours of labor every day; and no man, even strong and rugged of constitution, as Dr. Wasson was, could stand that strain without suffering for it." Owing to failing health he was compelled to give up his office practice over a year ago and spent some time at Excelsior Springs, Mo., with slight benefit. Last summer his improvement continued, and it was not until a week previous to his death that his condition became alarming. He made a brave fight for life, and he received every attention which medical science, nursing, and affection could give.

The funeral services were held at his home on Wednesday, March 1st, and were attended by a large number of friends and relatives, also by representatives of the Masonic order, the A. O. U. W., and the Elks, with which organizations he was connected. The honorary pallbearers were Drs. J. D. Patterson and J. P. Root, Kansas City, Mo.; C. B. Reed, Topeka, Kans.; W. A. Coston, Fort Scott, Kans.; G. A. Esterly and J. W. O'Bryon, Lawrence, Kans.; G. M. Wolfe, Ottawa, Kans.; and Mr. Cal Hettinger.

The esteem in which he was held by his professional colleagues is evidenced to some extent by the fact that he was elected president of the Kansas State Dental Society in 1898, and was its treasurer for several terms. As a practitioner of dentistry Dr. Wasson was conceded to be among those of the first rank, but it was especially his personal and manly characteristics which endeared him to his family and an unusually large circle of friends. One who knew him well and intimately has said, "I never knew of an act or thought of his that was not prompted by a noble and generous nature, and that such a life as he lived is a monument far more enduring than granite, and the record of 'every duty fearlessly and unselfishly met' a sufficient epitaph."

Dr. Wasson was married September 19,

1878, to Miss Mary J. Sherman, of Ottawa, Kans., who survives him. They have no children.

DR. AARON DAWES.

Died, February 18, 1905, at his home in Hightstown, N. J., Dr. Aaron Dawes, in the eighty-sixth year of his age.

The deceased was the son of Janney Dawes, and was born at Readington, Hunterdon county, N. J., on November 19, 1819. Selecting dentistry as his profession, he studied under a dentist in Taylorsville, Pa., and in 1840 moved to Hightstown, where he practiced for a short time. Failing in health he went South, where he practiced at Savannah and New Orleans, later returning to Hightstown, where he opened an office, and also one at Toms River, N. J. He was a pioneer in dentistry, and if not the first dentist in the state of New Jersey was very nearly the first.

Dr. Dawes always prided himself on his instruments, which he made for the most part himself. In his early practice he also made and baked all of the porcelain teeth used in his practice, and of these he had the molds of many different sets and combinations. His gold and silver dentures and old-time fillings of sixty years ago are not surpassed and rarely equalled by the work of the present time.

He was a prominent and unique figure in the life of the two towns and the surrounding country. In his earlier days he was a Whig, and cast his first ballot for William Henry Harrison, and in the campaign of Henry Clay he took a very prominent part in his support. He was a member of the first borough council of Hightstown, in 1853, and was four times elected its mayor.

In 1858 Dr. Dawes married Miss Josephine Van der Burg, who survives him, as do three sons, one of whom is Dr. Tracy H. Dawes of Somerville, N. J.

Possessed of keen financial insight, a wide knowledge of affairs, and a clear understanding of men, his counsel and aid in public matters were eagerly sought, and he held for many years a high place as one of the foremost citizens of the town, and in his youth and prime had played a large part in its development.

Dr. Dawes was highly respected as a man of sterling integrity, and those who knew him personally found in him a genial companion, a man of wide information and shrewd humor, and prized him for his many high qualities of mind and heart.

His town loses an honored citizen, his family a devoted husband and father, and many will mourn the loss of a very kind and helpful friend.

DR. HENRY H. BOWLES.

Died, at Lisbon, N. H., December 4, 1904, from heart trouble, Dr. Henry H. Bowles, in his seventy-second year.

Dr. Henry Hubbard Bowles was born on Sugar Hill, Lisbon, N. H., July 18, 1833, a son of Caleb and Martha Goodnow Bowles. He was of the third generation of his family who have lived in Lisbon.

He studied dentistry in early life and located for practice in Lisbon in 1860. He enjoyed a lucrative practice, and he was one of the first dentists in New England to use nitrous oxid as an anesthetic and vulcanize dental rubber for an artificial base. In 1872 he sold his practice to Dr. D. W. Cooling, and the next year located in Foxboro, Mass. In 1879 he associated himself with Mr. Seth F. Hoskins, under the firm name of Bowles & Hoskins, and together they built the now very popular summer hotel, the Sunset Hill House, on Sugar Hill. He continued his dental practice in Foxboro until 1885, when owing to ill health he retired, and has ever since resided in Lisbon.

Dr. Bowles was one of the oldest business men in Lisbon, a kind friend and neighbor, and a gentleman respected by all who knew him.

Dr. Bowles was never married. He is survived by one sister, Mrs. Mary Moulton, who kept house for him. He was a member of the Masonic order.

DENTAL LEGISLATION.

DENTAL LAW OF NEW ZEALAND.

[1904, No. 57.—November 8, 1904.]

AN ACT TO PROVIDE FOR THE REGISTRATION OF DENTISTS QUALIFIED TO PRACTICE, AND FOR THE REGULATION OF THE PRACTICE OF DENTISTRY IN NEW ZEALAND.

Be it enacted by the General Assembly of New Zealand in Parliament assembled, and by the authority of the same, as follows:

1. The short title of this Act is "The Dentists Act, 1904"; and it shall come into force on the tenth day of January, one thousand nine hundred and five.

2. In this Act, if not inconsistent with the context, "Senate" means the Senate of the University of New Zealand: "Minister" means the responsible minister of the Crown for the time being administering this Act: "Dentist" means a person registered under this Act: "Medical practitioner" means a medical practitioner duly registered under the law in force for the time being in New Zealand relating to medical practitioners: "Registrar" means the registrar-general of births, deaths, and marriages.

Registration.

3. (1) The registrar shall keep in his office a book called the "Dentists' Register," in which shall be inserted the names, residences, and qualifications of all persons registered under this Act, which book is referred to herein as the "register."

(2) Every person whose name is entered in the Dentists' Register under "The Dentists Act, 1880," at the coming into operation of this Act shall be registered under this Act without application or payment of fees, and until a register has been compiled under this Act the register under that Act shall be the register under this Act.

4. Registration shall be effected by the entry in the register of the name, residence, and qualifications of any person entitled or claiming to be registered.

5. On application made to him at any time for that purpose by any registered dentist, the registrar shall issue to such applicant a certificate of registration.

6. The Dentists' Register shall be open to inspection by the public.

7. The registrar shall from time to time erase the names of all registered persons who shall have died, and shall from time to time make the necessary alterations in the addresses of the persons registered under this Act.

8. (1) A copy of the register, certified by the registrar to be a true copy, shall, in the month of December in each year, be sent to the Colonial Secretary, and shall by him be published in the *Gazette*.

(2) A copy of the *Gazette* containing such publication shall be evidence for all purposes that the persons therein specified are registered according to the provisions of this Act: Provided that, in the case of any person whose name does not appear in such copy, a certified copy under the hand of the registrar of the entry of the name of the person shall be evidence that such person is registered.

9. Every dentist who obtains any higher degree, diploma, status, or any qualification other than the qualification in respect of which he is registered shall be entitled to have such higher degree, diploma, status, or additional qualification inserted in the register on payment of the prescribed fee.

10. Every adult person is entitled, on application to the registrar and on payment of the prescribed fee, to be registered as a dentist who (*a*) Is registered or is entitled to be registered in the United Kingdom in accordance with the law for the time being in force therein as a dentist or medical practitioner; or (*b*) Is the holder of a degree in dental surgery of the University of New Zealand, or has gone through such course of study and professional practice and training, passed such examinations, and obtained from the Senate such certificate of proficiency in dental surgery or dentistry as the Senate by regulations prescribes; or (*c*) Is entitled, in accordance with the provisions of this Act, to be registered as a foreign or colonial dentist; or (*d*) Satisfies the registrar that he has been engaged other than as an apprentice or pupil in New Zealand for a period of not less

than three years immediately preceding the passing of this Act in the work of extracting, stopping, and otherwise treating natural teeth, and of fitting and adjusting artificial teeth, and who for the last three months of such period has been so engaged as a principal: Provided that this subsection shall not apply to any person who has been engaged in the work of extracting teeth only: Provided also that no application under this subsection made after the first day of January, one thousand nine hundred and five, shall be entertained.

11. (1) Notwithstanding anything in this Act, any person who either (*a*) Is, at the time of the passing of this Act, a *bona fide* apprentice or pupil of a person registered under "The Dentists Act, 1880," or of one or more such persons; or (*b*) Has, prior to the time of the passing of this Act, been for at least three consecutive years a *bona fide* apprentice or pupil of a person registered under "The Dentists Act, 1880," or of one or more such persons, and has been continuously and wholly engaged during that period in studying the theory and practice of dentistry or dental surgery, shall be entitled to be examined by a board of examiners appointed in accordance with the law as it existed immediately prior to the commencement of this Act, and to be granted a certificate by such board and registered as a dentist upon passing such examinations and fulfilling such other conditions as would if this Act had not been passed have entitled him to such certificate and to be so registered: Provided that such board may in special cases recognize the apprenticeship or pupilage of any such person, notwithstanding that the three years of his apprenticeship and pupilage may not have been consecutive, or his period of study continuous. (2) For the purposes of this section the Acts hereby repealed shall remain in full force as if this Act had not been passed, save as modified by the proviso to the last preceding subsection; but no application for registration in pursuance of this section made after the first day of January, one thousand nine hundred and ten, shall be entertained.

12. Any person showing that he holds some recognized certificate as hereinafter defined granted in a British possession, and that he is of good character, shall upon payment of the fees be entitled, without examination, to be registered under this Act.

13. Any person showing that he holds some recognized certificate as hereinafter defined granted in a foreign country, and that he is of good character, and either continues to hold such certificate or has not been deprived thereof for any cause which disqualifies him for being registered under this Act, shall upon payment of the fees be entitled, without examination, to be registered under this Act.

14. The certificate granted in a British possession or in a foreign country which is to be deemed such a recognized certificate as is required for the purposes of this Act shall be such certificate, diploma, membership, degree, license, letters, testimonials, or other title, status, or document as may be recognized by the Senate as entitling the holder thereof to practice dentistry or dental surgery in such possession or country, and as furnishing sufficient guarantee of the possession of the requisite knowledge and skill for the efficient practice of dentistry or dental surgery.

15. (1) The Senate may from time to time, subject to the approval of the Governor in Council, make regulations specifying what certificates, diplomas, memberships, degrees, licenses, letters, testimonials, or other titles, status, or documents granted in a British possession or in a foreign country shall be recognized by the Senate as qualifying persons holding them or any of them to be registered. (2) The Senate may, when any person makes application to be registered in respect of any certificate, diploma, membership, degree, license, letters, testimonials, or other title, status, or document not specified in such regulations, entertain such application and deal with it specially, and may if the Senate thinks fit give to such applicant a certificate of recognition setting forth that he is the holder of a recognized certificate, and the registrar shall accept such certificate of recognition as an authority to register such applicant. (3) Where any person who is the holder of a degree, diploma, license, or certificate entitling him to practice in a British possession or in a foreign country, and which has been obtained after a course in dentistry of not less than three years, is refused a certificate of recognition under the last preceding subsection, and such person within twenty-one days after such refusal applies in writing to the Chancellor of the University of New Zealand for an examination in dentistry, the Chancellor shall thereupon appoint a time and place for the examination of such person in accordance with regulations under this Act, and such examinations shall take place within three months after the receipt of such application; and if such person duly passes such examination he shall be entitled to a certificate of recognition, which shall be accepted by the registrar as an authority to register such person.

16. The registrar may examine any person

who applies to be registered, and any person whom he may deem capable of giving evidence respecting such applicant, and may conduct any such examination upon oath, and for such purpose may administer oaths; and he may decline to register such applicant if for any reason he is of opinion that such applicant is not entitled to be registered: Provided that any person whose application has been refused under this section may appeal to a judge of the Supreme Court on summons; and such judge may either order the registrar to register such applicant or may support the registrar's decision, and may in his discretion award costs against the registrar or against the said applicant.

17. Every person who wilfully procures or attempts to procure himself or any other person to be registered under this Act by making or producing, or causing to be made or produced, any false or fraudulent representation or declaration, either verbally or in writing, is liable to twelve months' imprisonment.

18. (1) If any person has procured himself to be registered by making or producing, or causing to be made or produced, any false or fraudulent representation or declaration, either verbally or in writing, or if any person not entitled to be registered has been registered, the registrar shall erase the name of any such person from the register. (2) If any dentist is convicted in New Zealand or elsewhere of any offence which in the opinion of the Minister renders him unfit to be on the register, the Minister may order the name of such person to be erased from the register. (3) Every erasure from the register under this section shall be notified by the registrar in the *Gazette*.

Effect of Registration.

19. Every person registered under this Act and every medical practitioner shall be entitled to practice dental surgery and dentistry in any part of New Zealand, and to sue in any competent court for the recovery of his fees or other remuneration for his professional services in dentistry, or in the performance of any dental operation, or for any dental attendance or advice.

20. From and after the coming into operation of this Act, no person other than a medical practitioner or a dentist shall hold any appointment as a dentist, or dental practitioner, or dental surgeon in any hospital, infirmary, dispensary, or in any lunatic asylum, gaol, or in any institution receiving financial aid from the Government or licensed under any Act; or be entitled to recover any fee or charge in any court of law for the performance of any dental operation, or for any dental attendance or advice: Provided that a person who practices as an extractor of teeth only shall not be deemed to perform dental operations within the meaning of this section.

21. (1) From and after the coming into operation of this Act, no person other than a person registered under this Act or other than a medical practitioner shall, nor shall any company or association (other than an association consisting wholly of dentists), take or use or by inference adopt the name, title, word, letters, addition, or description of "dentist," or "dental practitioner," or "dental surgeon," or "surgeon dentist," or use or have attached to or exhibited at his or its place of business or residence (either alone or in combination with any other word, or words, or letters) the words "dental company," or "dental institute," or "dental hospital," or "dental college," or "college or school of dentistry," or "mechanical dentist," or any name, title, word, letters, addition, or description implying or tending to the belief that he or such company or association is registered under this Act, is qualified to practice dentistry, or is carrying on the practice of dentistry, or is entitled to or to use such name, title, word, letters, addition, or description: Provided that, with respect to any association which has carried on the practice of dentistry, or is entitled to or to use such months immediately preceding the passing of this Act, the persons who have been members of such association during such period shall be permitted, though not registered as dentists, to continue as members thereof after the passing of this Act, but no other persons except dentists shall be so permitted; and such association may continue to practice as aforesaid after the passing of this Act, but no dental operations shall be performed by any member of such association who is not a dentist, or by any person other than a dentist on behalf of such association. (2) In the case of an association carrying on the practice of dentistry, the names of the dentists forming such association shall be legibly and conspicuously affixed outside the premises where the association is practicing. (3) Every person, company, or association guilty of a breach of this section is liable to a fine not exceeding twenty pounds for every such offence, and after any conviction for any such offence shall be liable to a further penalty of five pounds for every day during which such breach is continued.

22. No dentist shall permit any unregis-

tered person to carry on the practice of dentistry in his name, or, except under his immediate supervision, to perform any dental operation on the premises where such dentist is practicing, or elsewhere on his behalf. Every dentist who permits any breach of this section, and every unregistered person who practices or performs a dental operation in breach of this section, is liable to a fine not exceeding twenty pounds.

Miscellaneous.

23. No dentist shall be liable while in actual practice to serve on any jury, and "The Juries Act, 1880," is hereby modified accordingly.

24. The Senate may, with the consent and approval of the Governor in Council, make regulations—(*a*) Prescribing the course of study, professional practice and training, and examination of persons desiring to obtain certificates of proficiency in dental surgery or dentistry, and the form of such certificates; (*b*) Fixing a scale of fees in respect of certificates of proficiency and the examinations therefor; (*c*) Providing for the examination of persons who are refused certificates of recognition by the Senate; (*d*) Providing for the registration of dental students; and (*e*) Generally for carrying into effect the objects of this Act.

25. All regulations made under this Act shall be published in the *Gazette.*

Fees.

26. (1) The registrar shall take and receive the undermentioned fees: On application, one pound; certificate of registration, five shillings; any alteration of register, five shillings; inspection of register, two shillings. (2) All such fees shall be paid into the public account, and shall form part of the Consolidated Fund.

27. (1) "The Dentists Act, 1880," "The Dentists Act 1880 Amendment Act, 1881," and "The Dentists Act Amendment Act, 1891," are hereby repealed, except for the purposes of section eleven hereof. (2) Such repeal shall not affect any registrations effected, or proceedings, acts, matters, and things done or commenced under the repealed enactments, or any of them, before the coming into operation of this Act.

28. Notwithstanding anything in this Act, if the number of those who satisfy the registrar that they are entitled to the benefit of subsection (*d*) of section ten hereof exceeds twenty this Act shall not come into operation.

SOCIETY NOTES AND ANNOUNCEMENTS.

DENTAL SOCIETY MEETINGS: April, May, and June, 1905.

APRIL.

American Dental Society of Europe. Geneva, Switzerland. Four days: April 21st to 24th.

Connecticut State Dental Association. New Haven. Two days: April 18th and 19th.

Delaware State Dental Society. Wilmington. April 5th.

Mississippi Dental Association. Jackson. Three days: April 18th to 20th.

New York (Fifth District) Dental Society. Syracuse. Two days: April 11th and 12th.

MAY.

Alabama Dental Association. Gadsden. Four days: May 9th to 12th.

Eastern Indiana Dental Association. Greenfield. Two days: May 3d and 4th.

Florida State Dental Society. La Breeze Beach. May 31st.

Georgia State Dental Society. Atlanta. Three days: May 4th to 6th.

Illinois State Dental Society. Moline. Three days: May 9th to 11th.

Iowa State Dental Society. Des Moines. Three days: May 2d to 4th.

Kansas State Dental Association. Topeka. Three days: May 18th to 20th.

Kentucky State Dental Association. Lexington. Two days: May 15th and 16th.

Lake Erie Dental Association. Cambridge Springs. Three days: May 16th to 18th.

Lebanon Valley Dental Association. Pottstown. Two days: May 16th and 17th.

Missouri State Dental Association. St. Louis. Three days: May 24th to 26th.

Nebraska State Dental Society. Lincoln. Three days: May 16th to 18th.

New York State Dental Society. Albany. Two days: May 12th and 13th.

Oklahoma Dental Association. Oklahoma City. Three days: May 15th to 17th.

Texas State Dental Association. Austin. Three days: May 18th to 20th.

Wisconsin (Southern) Dental Association. Racine. Two days: May 30th and 31st.

JUNE.

Indiana State Dental Association. Indianapolis. Three days: June 27th to 29th.

Massachusetts Dental Society. Boston. Two days: June 7th and 8th.

Minnesota State Dental Association. Minneapolis. Three days: June 1st to 3d.

Pennsylvania State Dental Society. Philadelphia. Three days: June 27th to 29th.

Examiners' Meetings.

Arkansas Board of Dental Examiners. Texarkana. May 22d and 23d.

Connecticut Dental Commissioners. Hartford. May 27th.

Illinois Board of Dental Examiners. Chicago. May 4th to 6th.

Iowa Board of Dental Examiners. Des Moines. May 2d and 3d.

Kansas Board of Dental Examiners. Topeka. May 15th to 17th.

Maryland Board of Dental Examiners. Baltimore. May 15th and 16th.

New Jersey Board of Registration. Trenton. July 11th to 13th.

Oklahoma Board of Dental Examiners. Oklahoma City. May 15th t 17th.

Pennsylvania Board of Dental Examiners. Philadelphia and Pittsburg. June 6th to 9th.

Rhode Island Board of Registration. Providence. June 27th to 29th.

South Dakota Board of Dental Examiners. Mitchell. July 11th.

Texas Board of Dental Examiners. Austin. May 15th.

West Virginia Board of Dental Examiners. Morgantown. June 7th to 9th.

"F. D. I."

INTERNATIONAL DENTAL FEDERATION.

The next annual meeting of the Executive Council of the Fédération Dentaire Internationale will convene in Hanover, Germany, August 7, 1905, immediately following the annual meeting of the Central-Verein Deutscher Zahnärzte. Announcement of the program for the meeting and the projected work for the Federation during the present period will shortly be made through the dental journals and through the official bulletin of the Federation.

Edward C. Kirk, *Secretary-general.*

AMERICAN DENTAL SOCIETY OF EUROPE.

The next annual meeting of the American Dental Society of Europe will take place at Geneva, Switzerland, April 21 to 24, 1905. A cordial invitation is extended to members of the profession.

Chas. J. Monk, *Hon. Sec'y.*

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The annual meeting of the National Association of Dental Faculties will be held in Buffalo, N. Y., commencing at 2 P.M. Thursday, July 27, 1905. The Executive Committee will meet at 10 A.M. on the same day.

Special business to come before the N. A. D. F. is the consideration of the proposed revision of the constitution and by-laws.

H. B. Tileston, *Chairman Ex. Com.*,
John I. Hart, *Sec'y Ex. Com.*,
New York, N. Y.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The annual meeting of the National Association of Dental Examiners will be held at the Iroquois Hotel, Buffalo, N. Y., beginning Monday at 10 A.M., July 24, 1905, and continuing until adjournment. The rates per day for single rooms will be $1.50, $2, and $2.50, $3 and $4 for double, and $3 and $3.50 for rooms with bath. The sessions will be

held in commodious rooms in the hotel. Write early and secure your accommodations. Arrangements have already been made for members from the East for reduced excursion rates on the fast trains of the Delaware and Lackawanna Railroad, leaving New York 10 A.M., 6.10 P.M., 8.45 P.M., and 2 A.M. It is earnestly requested that the secretaries of the boards will communicate at once of changes in members' names and addresses

CHAS. A. MEEKER, *Sec'y*,
29 Fulton st., Newark, N. J.

NATIONAL DENTAL ASSOCIATION.

COMING MEETING—SECTION III.

IN preparation for the meeting of the National Dental Association at Buffalo, N. Y., July 25 to 28, 1905, original papers and investigations are asked to be submitted upon the following topics: Oral surgery, anatomy, physiology, histology, pathology, etiology, hygiene, prophylaxis, materia medica, and allied subjects.

J. D. PATTERSON, *Ch'man Sect. III.*,
Kansas City, Mo.

XI PSI PHI FRATERNITY.

THE annual smoker of the Supreme Chapter of the Xi Psi Phi Fraternity will be held in Chicago, at the Auditorium, Friday evening, April 7, 1905. For further particulars address J. E. McArthur, D.D.S., first vice-president Supreme Chapter, 9836 Ewing ave., Chicago, Ill.

FIFTH DISTRICT (N. Y.) DENTAL SOCIETY.

THE thirty-seventh annual meeting of the Fifth District Dental Society of the State of New York will be held at the Yates Hotel, Syracuse, on Tuesday and Wednesday, April 11 and 12, 1905. First session begins promptly at 2 o'clock on Tuesday.

An excellent program has been prepared.

Dr. Wm. Jarvie, president of the New York State Society, will be present.

E. A. SMITH, *Sec'y*,
Rome, N. Y.

"LEWIS AND CLARK" DENTAL CONGRESS.

THE Lewis and Clark Dental Congress to be held in Portland, Oregon, July 17, 18, 19, and 20, 1905, promises to be the largest ever held on the Pacific Coast.

GENERAL COMMITTEE.

NORRIS R. COX, D.D.S., *Chairman*, Abington Bldg., Portland, Oregon.

ARTHUR W. CHANCE, D.D.S., M.D., *Secretary*, 809-810 Dekum Bldg., Portland, Oregon.

The following associations are in affiliation:

OREGON.—State Dental Association. Stomatological Club.

CALIFORNIA.—State Dental Association. Southern California Dental Association. San Francisco Dental Association. Alameda County Dental Society.

BRITISH COLUMBIA. — British Columbia Dental Association.

WASHINGTON.—State Dental Association. Seattle Dental Club. Tacoma Dental Club. Spokane Dental Club.

IDAHO.—State Dental Association.

MONTANA.—State Dental Association.

UTAH.—State Dental Association.

NEVADA.—

COMMITTEES.

Executive Committee.—Norris R. Cox, Portland, Chairman; C. S. Irwin, Vancouver, Wash.; Arthur W. Chance, Portland, Secretary; Jean Cline, Portland; E. G. Clark, Portland.

Committee on Essays.—S. J. Barber, Portland, Chairman; C. L. Goddard, San Francisco; B. F. Eschelman, Tacoma.

Committee on Clinics.—G. H. Nottage, Portland, Chairman; J. M. Meyer, Tacoma, Wash.; C. E. Post, San Francisco; A. Stark Oliver, Spokane, Wash.; Claude W. Gates, Salt Lake, Utah; J. H. Holmes, New Westminster, B. C.; A. W. Cate, Boise, Idaho; W. H. Barth, Great Falls, Mont.; F. I. Shaw, Seattle, Wash.

Committee on Exhibits and Manufacturing Clinics.—W. F. Lewis, Portland, Chairman; Woodard, Clarke & Co., Portland; Archer & Schanz Co., Portland; John Welch Dental Depot, Portland; Oregon Dental Supply Co., Portland.

The Committee on Clinics asks for voluntary clinics or table demonstrations from members of the profession, and suggests that

notice of the same be sent the committee as soon as possible. In order that the program be complete, names of clinicians and clinics must reach the chairman of Clinic Committee not later than June 15th.

GEORGIA STATE DENTAL SOCIETY.

The next meeting of the Georgia State Dental Society will be held in Atlanta, Ga., May 4, 5, and 6, 1905.

D. H. McNeill, *Cor. Sec'y*,
Athens, Ga.

EASTERN INDIANA DENTAL ASSOCIATION.

The Eastern Indiana Dental Association will hold its thirty-fifth annual meeting at Greenfield, Ind., May 3 and 4, 1905. A splendid program of papers and clinics is being prepared.

G. E. Stevenson, *Sec'y*,
Liberty, Ind.

ALABAMA DENTAL ASSOCIATION.

The next annual meeting of the Alabama Dental Association will be held in Gadsden, Ala., May 9 to 12, 1905.

It is earnestly desired and confidently expected that we will have a large attendance, and the most successful meeting in the history of the Association.

L. A. Crumly, *Sec'y*,
118½ 19th st., Birmingham, Ala.

MISSISSIPPI DENTAL ASSOCIATION.

The next meeting of the Mississippi Dental Association will be held in Jackson, Miss., April 18, 19, and 20, 1905. We expect to have a banner meeting, and an attractive and instructive program. Every dentist in the state is most earnestly requested to attend and lend a helping hand.

E. N. Bigham, *Sec'y*,
Pontotoc, Miss.

UNIVERSITY OF CALIFORNIA

Alumni Association—Dental Department.

The annual meeting and clinics of the Alumni Association of the Dental Department of the University of California will be held at the college infirmary, corner of Taylor and Market streets, San Francisco, May 16 and 17, 1905.

Assurance of a large number of clinics will guarantee a successful meeting.

All reputable legal practitioners are cordially invited to be present.

Percy D. Gaskill, *Sec'y*,
San Francisco, Cal.

NEW YORK STATE DENTAL SOCIETY.

The thirty-seventh annual meeting of the Dental Society of the State of New York will be held at Albany, N. Y., Friday and Saturday, May 12 and 13, 1905, convening at 10 o'clock on the morning of the first day, in Assembly Hall, at the Hotel Ten Eyck, where the committee of arrangements have made special rates for all attending the convention. Special railroad rates have also been secured. Ask for a special certificate when you purchase your ticket, as without it you cannot have the benefit of the reduced rates on the return trip.

In addition to the regular reports of the standing and special committees the officers and business committee present the following list of essayists: President's Address, Wm. Jarvie. Correspondent's Report, Ellison Hillyer. Report of Committee on Practice, A. L. Swift. Report of Committee on Scientific Research, F. W. Low. "A Field for Women in Dental Practice," Edwin T. Darby, Philadelphia. "The Chemistry of Pulp-Decomposition with Reference to the Discoloration of the Teeth, including a Rational Treatment for the Correction of the Putrescent Condition," J. P. Buckley, Chicago. "Ethics," A. H. Peck, Chicago. "Dentistry Today," S. G. Perry, New York. (Subject to be announced) W. T. Reeves, Chicago. (Subject to be announced) I. N. Broomell, Philadelphia. "Our Society: A Study and Appeal," C. W. Stainton, Buffalo.

Besides the above papers and reports a large number of clinics will be given by some of the ablest members of the profession, altogether making this a most interesting and instructive

meeting—one which no dentist in this state can afford to miss.

The committee of arrangements are planning for an exhibit of old and curious dental instruments, odd and abnormal models, old books, pictures, etc. All members are requested to bring to the meeting anything antique or interesting to the profession, or such articles may be forwarded to Dr. J. L. Appleton, Albany.

There will be a large exhibit of dental appliances and supplies. For information regarding exhibits address Dr. J. L. Appleton, 89 Columbia st., Albany, N. Y.

A cordial invitation is extended to all members of the profession, and it is hoped that every member attending may be in his place at the beginning of the opening session.

Wm. Jarvie, *Pres.*, Brooklyn, N. Y.,
Wm. C. Deane, *Sec'y*,
616 Madison ave., New York city.

ILLINOIS STATE DENTAL SOCIETY.

The annual meeting of the Illinois State Dental Society will be held at Moline, May 9, 10, and 11, 1905.

Elgin MaWhinney, *Sec'y*,
Chicago, Ill.

CONNECTICUT STATE DENTAL ASSOCIATION.

The forty-first annual convention will be held in the Y. M. C. A. building, New Haven, Conn., Tuesday and Wednesday, April 18 and 19, 1905. The members of the following societies are invited to attend: New Jersey State Dental Association, Central Dental Association of Northern New Jersey, First District Dental Society of New York, Second District Dental Society of New York, New York Odontological Society, Institute of Stomatology (N. Y.), and the state dental societies of New York, Vermont, Massachusetts, and Rhode Island.

The program will be as follows: Dr. Sol. Freeman, New York city, "The Use of Compressed Air in Operative Dentistry." Dr. Joseph Head, Philadelphia, "The Best Method of Inserting Adhesive Gold and Amalgam Fillings." Dr. C. N. Johnson, Chicago, "Difference in the Preparation of Cavities for Fillings and Inlays." Dr. M. L. Rhein, New York, "The Technique of Pulp-Removal and Root-Treatment Associated Therewith." Dr. L. Ashley Faught, Philadelphia (subject to be announced). Dr. J. Tenney Barker, Wallingford, Conn., Recorder State Board of Dental Examiners, "Dental Legislation."

F. Hindsley, *Sec'y*,
Bridgeport, Conn.

OKLAHOMA DENTAL ASSOCIATION.

The fifteenth annual meeting of the Oklahoma Dental Association will be held in Oklahoma City, beginning at 8 p. m., May 15, 1905, and continuing until the evening of the 17th. Indications are for a large and enthusiastic meeting. The profession is cordially invited to attend.

C. L. White, *Sec'y*,
115½ Main st., Oklahoma City, Okla.

KENTUCKY STATE DENTAL ASSOCIATION.

The next annual meeting of the Kentucky State Dental Association will convene at Lexington, Ky., May 15 and 16, 1905.

We anticipate a most pleasant as well as profitable meeting, and a cordial invitation is extended to the profession.

W. M. Randall, *Sec'y*,
Masonic Bldg., Louisville, Ky.

LEBANON VALLEY DENTAL ASSOCIATION.

The thirtieth annual meeting of the Lebanon Valley Dental Association will be held at Pottstown, Pa., May 16 and 17, 1905.

Meetings, clinics, and exhibits will be held in the Auditorium, a commodious and well-lighted hall. An excellent opportunity for exhibits. For space write the chairman of the Exhibit Committee.

C. R. Scholl,
Reading, Pa.

LAKE ERIE DENTAL ASSOCIATION.

The annual meeting of the Lake Erie Dental Association will be held at Hotel Rider, Cambridge Springs, Pa., May 16, 17, and 18, 1905.

The executive committee expects to present a program of papers and clinics of unusual

excellence. All reputable dentists are invited to meet with the association at this famous health resort.

V. H. McAlpin, *Sec'y*,
Warren, Pa.

MISSOURI STATE DENTAL ASSOCIATION.

The Missouri State Dental Association will meet in St. Louis, May 24, 25, and 26, 1905.

An excellent program of papers and clinics is being prepared, and all ethical members of the profession are cordially invited to attend.

Sam T. Bassett, *Cor. Sec'y*,
St. Louis, Mo.

TEXAS STATE DENTAL ASSOCIATION.

The Texas State Dental Association will meet at Austin, Texas, May 18, 19, and 20, 1905. All ethical members of the profession are invited to meet with us.

Bush Jones, *Sec'y*,
Dallas, Texas.

NEBRASKA STATE DENTAL SOCIETY.

The twenty-ninth annual meeting of the Nebraska State Dental Society will be held at the Lincoln Dental College, Lincoln, Neb., May 16, 17, and 18, 1905.

The clinic committee promises us the best meeting in the history of the society. All reputable members of the profession are invited to attend.

M. E. Vance, *Sec'y*,
Lincoln, Neb.

MONTANA DENTAL SOCIETY.

The second annual meeting of the Montana Dental Society was held in Butte on February 20 and 21, 1905, and was highly successful. The membership has at present reached fifty-one and there are strong expectations that one hundred members will be enrolled by the time of the next annual meeting. Clinics and practical demonstrations in porcelain work were given by Dr. Prothero of the Northwestern University of Chicago. Certain suggested changes in the state dental law were agreed upon, with every reason to believe that the Legislature at its next session will so revise the statues that only graduates of reputable dental colleges will be eligible before the Montana State Board of Dental Examiners.

The following officers were elected: Dr. T. M. Hampton, Helena, president; Dr. D. J. Wait, Helena, first vice-president; Dr. D. J. MacDonald, Anaconda, second vice-president; Dr. A. D. Galbraith, Butte, secretary; Dr. W. A. Allen, Billings, treasurer.

The next annual meeting of the society will be held February 23 and 24, 1906.

A. D. Galbraith, *Sec'y*,
Butte, Mont.

MINNESOTA STATE DENTAL ASSOCIATION.

The twenty-second annual meeting of the Minnesota State Dental Association will be held in Minneapolis, Minn., on June 1, 2, and 3, 1905.

Geo. S. Todd, *Sec'y*,
Lake City, Minn.

KANSAS STATE DENTAL ASSOCIATION.

The thirty-fourth annual session of the Kansas State Dental Association will be held in Topeka, May 18, 19, and 20, 1905. Special attention is being given to the clinical program.

A cordial invitation to be present is extended to the profession. Headquarters at Copeland Hotel.

F. O. Hetrick, *Sec'y*,
Ottawa, Kansas.

INDIANA STATE DENTAL ASSOCIATION.

The Indiana State Dental Association will meet in Indianapolis, Ind., in the Claypool Hotel, June 27, 28, and 29, 1905. A rousing meeting is promised, with numerous exhibits, on the same floor.

A. T. White, *Sec'y*,
New Castle, Ind.

SOUTHERN WISCONSIN DENTAL ASSOCIATION.

The eleventh annual meeting of the Southern Wisconsin Dental Association will be held at Racine, Wis., May 30 and 31, 1905.

The profession are cordially invited to attend.

C. W. Collver, *Sec'y*,
Clinton, Wis.

WOMAN'S DENTAL ASSOCIATION.

At the annual meeting of the Woman's Dental Association, held at 201 S. Twelfth st., Philadelphia, March 4, 1905, the following officers were elected for the year 1905-1906: Emily W. Wyeth, president; H. Belle Whitcomb, vice-president; Rebecca R. Cornish, corresponding secretary; Eliza Yerkes, recording secretary; Elizabeth A. Davis, treasurer. Executive Committee—Francis Crouch, Annie T. Focht, Martha Corkhill, Anna K. Leaming, Matilda Groth.

Eliza Yerkes, *Sec'y*,
Philadelphia, Pa.

HARVARD ODONTOLOGICAL SOCIETY.

The Harvard Odontological Society held its annual meeting at Young's Hotel, Boston, Mass., on Saturday evening, February 25, 1905.

There was a reception and dinner, followed by an illustrated lecture, entitled "In Shakespeare's Country," by Rev. Geo. W. Kent of Providence, R. I. Music was furnished by Mrs. Winifred Powell.

The officers elected for the ensuing year are Ned A. Stanley, president; John W. Estabrooks, recording secretary; Arthur H. Stoddard, corresponding secretary; A. Winchester Hardy, treasurer; Robert Whitehill, editor. Executive Committee—John W. Estabrooks, Wm. P. Cooke, Lyman F. Bigelow.

Arthur H. Stoddard, *Sec'y*,
Boston, Mass.

NEW YORK INSTITUTE OF DENTAL TECHNIQUE.

At the regular meeting of the New York Institute of Dental Technique, held at the Hotel Chelsea, February 28, 1905, Dr. E. Darwin Reed presented a paper, and demonstrated an appliance for retaining loose teeth.

Dr. Sinclair Tousey of New York city, presented a paper entitled "X-Ray Examination of the Teeth: (a) Conditions in which it is Required; (b) The Author's Dental Fluoroscope; (c) Technique of Dental Radiography; (d) Protection of the Patient from Any Possibility of Injury."

E. Darwin Reed, *Sec'y*,
874 Broadway, New York city.

KANSAS BOARD OF DENTAL EXAMINERS.

The Kansas State Board of Dental Examiners will meet in Topeka, Kansas, May 15, 16, and 17, 1905, for the purpose of examining applicants who desire a license to practice dentistry in this state.

The examination will be both practical and theoretical. Applicants should notify the secretary of their intention to take the examination not later than May 1st, and must be present at nine o'clock of the morning of Monday, May 15th, with instruments and materials ready for all practical work. For further particulars address

M. T. Hults, *Sec'y*,
Hutchinson, Kansas.

ILLINOIS BOARD OF DENTAL EXAMINERS.

The next regular meeting of the Illinois State Board of Dental Examiners to examine applicants for license to practice dentistry in this state will be held in Chicago, May 4, 5, and 6, 1905.

Under an opinion of the Attorney-general the following are eligible to take the examination before the board: "Anyone holding a medical diploma from a reputable medical college; anyone who has been a legal practitioner of dentistry for ten years prior to moving into the state, and anyone who failed to register in this state at the time the law went into effect, which was in 1881."

Candidates must furnish their own patients, and come provided with the necessary instruments, rubber dam, and gold to perform practical operations, and such other work as is deemed advisable by the board. Those desiring to take the examination should matriculate with the secretary at least ten days before the date of meeting. The examination fee is ten dollars. Any further information can be obtained by addressing

J. G. Reid, *Sec'y*,
1204 Trude Bldg., 67 Wabash ave., Chicago.

IOWA BOARD OF DENTAL EXAMINERS.

THE Iowa State Board of Dental Examiners will hold its first meeting for 1905 at Des Moines, in the Capitol building, May 2d and 3d.

The second meeting will be held at Iowa City, June 15th and 16th. All those who expect to take the examination should file their application at least two weeks previously.

E. D. BROWER, *Sec'y*,
Le Mars, Iowa.

TEXAS BOARD OF DENTAL EXAMINERS.

THE Texas State Board of Dental Examiners will meet in Austin, Texas, May 15, 1905, for the purpose of examining all applicants. Examinations will be both theoretical and practical. Applicants must furnish their instruments, materials, and patients for any demonstration called for by the Board.

M. S. MERCHANT, *Pres.*, Giddings, Texas.
C. C. WEAVER, *Sec'y*, Hillsboro, Texas.

PENNSYLVANIA BOARD OF DENTAL EXAMINERS.

THE Board of Dental Examiners of Pennsylvania will conduct examinations simultaneously in Philadelphia and Pittsburg, June 6 to 9, 1905.

For papers or further information applicants must address

Dr. N. C. SCHAFFER, *Sec'y Dental Council*,
Harrisburg, Pa.

WEST VIRGINIA BOARD OF DENTAL EXAMINERS.

THE West Virginia State Board of Dental Examiners will hold its annual meeting for examinations in Morgantown, W. Va., June 7, 8, and 9, 1905.

Applications should be filed with the secretary before June 1st. Application blanks and all necessary information will be furnished by the secretary.

H. M. VAN VOORHIS, *Sec'y*,
Morgantown, W. Va.

MARYLAND BOARD OF DENTAL EXAMINERS.

THE Maryland State Board of Dental Examiners will meet for examination of candidates for certificates May 15 and 16, 1905, at the Dental Department of the Baltimore Medical College, N. Howard st., Baltimore, Md., at 9 A.M.

For application blanks and all further information address

F. F. DREW, *Sec'y*,
701 N. Howard st., Baltimore, Md.

RHODE ISLAND BOARD OF REGISTRATION.

THE next meeting of the Rhode Island Board of Registration in Dentistry for the examination of candidates will be held at the Statehouse, Providence, R. I., June 27, 28, and 29, 1905.

All applications, together with the fee of twenty dollars, must be in the hands of the secretary not later than June 20th.

W. S. KENYON, *Sec'y*,
301 Westminster st., Providence, R. I.

NEW JERSEY BOARD OF REGISTRATION.

THE New Jersey State Board of Registration and Examination in Dentistry will hold its semi-annual examination in the theoretical branches in the assembly chamber of the Statehouse at Trenton, N. J., July 11, 12, and 13, 1905. Practical prosthetic work will be done at the office of Dr. A. Irwin, 425 Cooper st., Camden, N. J.; practical operative work at the office of Charles A. Stockton, 22 Central ave., Newark, N. J.

All applications must be in the hands of the secretary ten days prior to the examination. Fee for examination $25.00.

For information apply to

CHAS. A. MEEKER, *Sec'y*,
29 Fulton st., Newark, N. J.

ARKANSAS BOARD OF DENTAL EXAMINERS.

THE next meeting of the Arkansas State Board of Dental Examiners will be held May 22 and 23, 1905, in Texarkana, Ark. Those having applied for examination will report to

the secretary Monday morning, May 22, 1905, with rubber dam, gold, plastic filling material, and instruments to demonstrate their skill in operative dentistry. Anyone who wishes may bring his own patients. As far as possible, patients will be furnished. The board reserves the right to select the cavity to be filled. The examination will cover all branches of the dental profession. No temporary certificates issued to anyone. Examination fee five dollars. For further information write to

A. T. McMillin, *Sec'y*,
Little Rock, Ark.

DENTAL COMMISSIONERS OF CONNECTICUT.

The Dental Commissioners of Connecticut hereby give notice that they will meet at Hartford May 27, 1905, as prescribed by law, and will adjourn to June for the summer examinations, so as to give students who do not finish their college or other educational course until June an opportunity to secure a license to practice without the long delay now made necessary by being required to wait until the following year.

By direction of the Dental Commissioners.

J. Tenney Barker, *Recorder*,
Wallingford, Conn.

SOUTH DAKOTA BOARD OF DENTAL EXAMINERS.

The next meeting of the South Dakota State Board of Dental Examiners will be held at Mitchell, S. D., July 11, 1905, beginning at 1.30 p.m.

All candidates will be required to perform practical work in both operative and prosthetic dentistry, and should bring all instruments and materials necessary. Vulcanizer, lathe, and swaging appliances will be furnished by the Board. Application, together with fee of ten dollars, must positively be in the hands of the secretary before July 7th.

G. W. Collins, *Sec'y*, Vermillion, S. D.

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING FEBRUARY 1905.

February 7.

No. 781,762, to Luther L. Bosworth. Electrical dental furnace.

No. 782,108, to Raymond C. Coburn. Apparatus for administering anesthetics.

February 14.

No. 782,627, to Herbert J. Tarr, Jr. Dental plate.

February 21.

No. 783,327, to Adelbert W. Starbuck. Dental root-impression and swaging instrument.

No. 783,358, to Samuel S. Bloom. Tooth-crown anchor.

February 28.

No. 783,609, to John E. Canning. Tooth-regulator.

No. 783,804, to Lawrence A. Smith. Dental measuring instrument.

No. 783,959, to Roscoe H. Hull. Dental separating disk.



DR. CLARKE LAMOTTE GODDARD.

THE

DENTAL COSMOS.

VOL. XLVII. MAY 1905. No. 5.

ORIGINAL COMMUNICATIONS.

DETERMINATION OF THE NORMAL ARCH, AND ITS APPLICATION TO ORTHODONTIA.

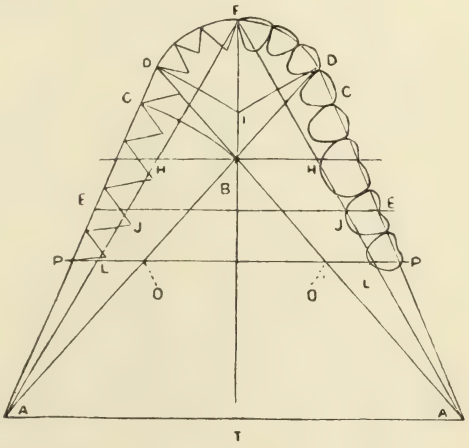
By C. A. HAWLEY, D.D.S., Columbus, O.

(Read before Section VI, Fourth International Dental Congress, St. Louis, Mo., August 29, 1904.)

IN considering cases in orthodontia where the teeth are malposed and the form of the arch consequently distorted, the question naturally arises, "What is the proper arch for these teeth"? If they are normal and uniform in size, there must be some particular arch for them which they will exactly fill, and its form and the position of the contact points and occlusion be correct. Heretofore the judgment of the eye, trained by observation of what seem to be the most perfect specimens of nature's work, has been the only guide; but human judgment of this kind is apt to err, and the object of the investigation described in this paper is to find some data that will be accurate and exact and form a trustworthy guide.

Dr. Bonwill, in his valuable work on the articulation of the teeth and the movement of the jaws in mastication, outlined the geometrical principles on which the movements of the jaws are based, and the form of an ideal arch. This arch is constructed upon the equilateral triangle, and with slight modifications has been universally accepted as correct, and forms the basis of the most advanced teaching on this subject. It

FIG. 1.



is shown in the familiar illustration (Fig. 1), the base A A representing the distance between the condyles, the apex of the triangle resting between the central incisor teeth at the cutting edges.

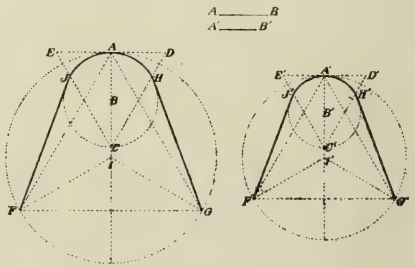
The six front teeth are arranged in an arc of a circle the radius of which is determined by the combined widths of the central, lateral, and canine teeth. From the distal point of the canine the bicuspids and molars are arranged in straight lines passing to the extremities of the base of the triangle, the points of the buccal cusps being cut by the line. The line drawn through B passes through the middle point between the buccal cusps of the first molars. In commenting on this arrangement of teeth, the author of the article on the subject in "The American Text-Book of Prosthetic Dentistry," from which the drawing is taken, says: "In natural dentures the second and third molars are turned slightly toward the median line and the line drawn through B more often passes through the crest of the disto-buccal cusps of the first molars." These modifications are, I think, generally accepted as correct.

In the practical application of this form of arch to the arrangement of artificial teeth, Dr. Bonwill constructed an articulator upon the basis of a four-inch equilateral triangle, this having been found to be the average width between the condyles in an examination of a great number of skulls, the width varying from three and one-half to five inches. The casts were mounted on this articulator in such a manner as to copy the form of the natural denture. In setting the teeth, the centrals, laterals, and canines were arranged in the arc of a circle the radius of which was determined by their widths. The bicuspids and molars were carried back in a straight line not exactly to the base of the four-inch triangle represented by the articulator, but moved inward or outward to bring the stress of mastication as nearly as possible over the ridge and still preserve the proper lateral movement of the jaw as represented by the articulator. The exact width between the molars is thus determined by the judgment of the operator, or the conditions or position of the ridge. Unless this were done, narrow teeth arranged in a four-inch triangle would be too wide in the molar region and, *vice versa,* wide teeth too narrow.

In orthodontia we meet a different problem. We have presented a set of teeth to rearrange in the living subject. We can determine the exact widths of the teeth. There is no means of measuring the width between the condyles with any degree of accuracy, and we cannot place them in the average arch based upon the four-inch triangle. The arch must be found from some other data, and we will select the front teeth.

Take as an example any case, and from the combined widths of the central, lateral, and canine as a radius, draw a circle *A H C* (Fig. 2). Measure the radius upon the circumference of the cir-

Fig. 2.

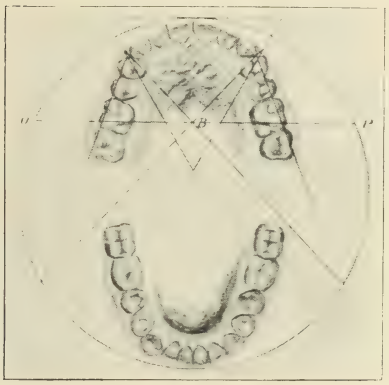


cle at *H* and *J*, marking the distal points of the canines. From *C* the end of one of the radii of the circle, drawn through *A* and *B*, draw the lines *C D* and *C E* through *H* and *J*, extending them indefinitely. Draw a tangent to the circle at *A* cutting these lines at *D* and *E*, forming the equilateral triangle *C D E*. Take one side of this triangle as the radius of a circle passing through *A* with the center *I* upon the extension of the line *A C*. From *A* mark off the radius of the circle upon the circumference six times and draw the inscribed triangle *A F G*. Draw the lines *F J* and *G H*. We have now an arch based upon and arranged with an equilateral triangle, but proportional to the widths of the three front teeth, or the radius *A B*.

To prove that such diagrams will always be similar and proportional to the

radii, from the radius A' B' draw another diagram supposed to represent a smaller set of teeth. In similar triangles the corresponding dimensions are always

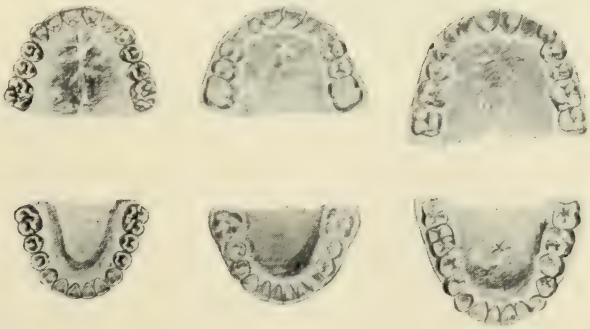
Fig. 3.



proportional. The triangles C D E and C' D' E' are similar because they are both equilateral. They are constructed upon altitudes A C and A' C' equal respectively to twice the radii of the circles A H C and A' H' C'. Therefore, the base E D is to the base E' D' as the radius A B is to the radius A' B'. But E D and E' D' are by construction equal respectively to the radii of the circles A G F and A' G' F'. From the centers of the latter circles draw I F, I G, I' F' and I' G'. The triangles I F G and I' F' G' are similar since they are equiangular (A F G and A' F' G' being equilateral triangles). Therefore F G is to F' G' as I G is to I' G' or as E D is to E' D' or as A B is to A' B'. Or if the arch presented is an ideal one, we may, from any widths of teeth given, construct a similar arch proportional to the given set of teeth.

Having the arch drawn, the teeth may be laid off on it, with a pair of dividers from measurements on the plaster cast, thus locating their exact positions, as shown in Fig. 3. In this figure the widths of the teeth are marked above the arch. They are actually marked by needle points in the paper, but here are inked in order to show better in the photograph. In measuring off the front teeth there is a small space, about one-thirty-second of an inch, between the canine and first bicuspid. This is because the widths of the teeth are taken in a straight line and are measured off on a curve. Notice that the line O P passing through B parallel to the base of the triangle, passes through the crest of the disto-buccal cusps of the first molars. I have found this true of every case that I have drawn. Variations in the proportional widths of the bicuspids might cause it to vary slightly, but I have not yet found such a case.

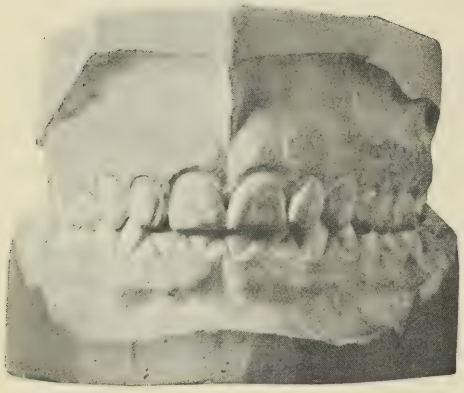
Fig. 4.



The second molars are turned slightly toward the median line. The lower arch is drawn from measurements of the lower teeth.

Drawings made from different cases will vary in appearance in accordance with the characteristics of the teeth themselves, yet all will be symmetrical. This is shown in three cases in Fig. 4,

Fig. 5.



where the combined widths of the three teeth in each case are respectively ninety-two, ninety-four, and ninety-eight one-hundredths of an inch.

While Dr. Bonwill's arch has been universally accepted as ideal, and the geometrical demonstration shows that it can be accurately reproduced from the data previously taken, yet it will be interesting to follow its application to several cases. In Fig. 5 we have the occlusion of a pair of casts kindly loaned me by Dr. M. T. Watson. Not only are these casts perfect in occlusion, but the form of the arch, as shown in Fig. 6, is equally faultless. At the side is a diagram drawn from the widths of the teeth. The lines drawn across it show corresponding measurements taken from the cast with a pair of compasses from tip to tip of the buccal cusps of the bicuspids and from the crest of the mesiobuccal cusps of the molars. They exactly correspond, and if our arch is ideal, then the casts show not only a perfect occlusion but a correctly formed arch as determined from the widths of the teeth. The subject from whom the casts were made is of lymphatic temperament.

Fig. 7 shows casts of a subject of nervous temperament. The occlusion is not perfect on the right side, the lower first molar having been extracted and the space closed. In Fig. 8 we see the form of the arch and a diagram of the upper teeth drawn from the same data as before. This arch in all essential points conforms to the diagram, though there are some deviations. The buccal cusps of the first molars are turned outward slightly and the arch on the line

Fig. 6.

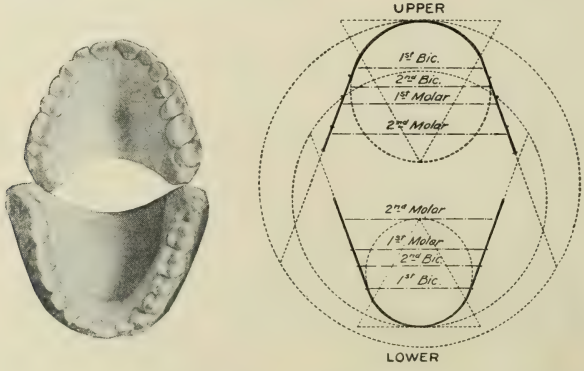
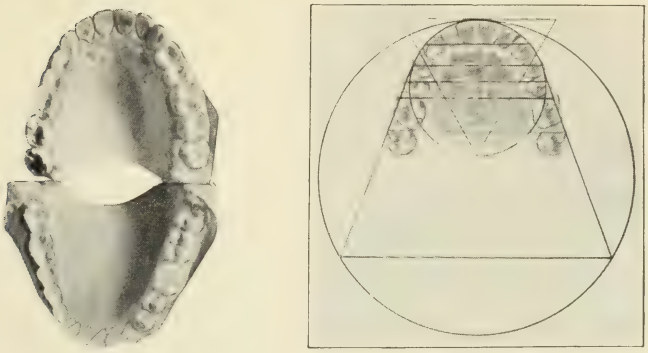


Fig. 7.



Fig. 8.



of the first bicuspids is a little narrow, owing probably to the readjustment after extraction. Yet it is an arch that would be generally considered unusually well developed.

Having shown these cases of perfect arches and compared them with the diagrams we will now consider some deviations. First the left side of a skull with good occlusion (Fig. 11), also (Fig. 12) the form of the arch with a diagram beside it. It is, as you see, too narrow, the lines of measurement stopping short in every tooth.

Fig. 9.



Fig. 9 shows the left side of a skull with good occlusion. The form of the arch is nearly perfect, as shown in Fig. 10.

Next I wish to show (Fig. 13) the occlusal views of these two skulls together for comparison. It is interesting to note that the combined widths of the three teeth in No. 2, the narrow arch, are one-thirty-second of an inch wider than those in No. 1, making the base of the triangle upon which the arch is drawn

Fig. 10.

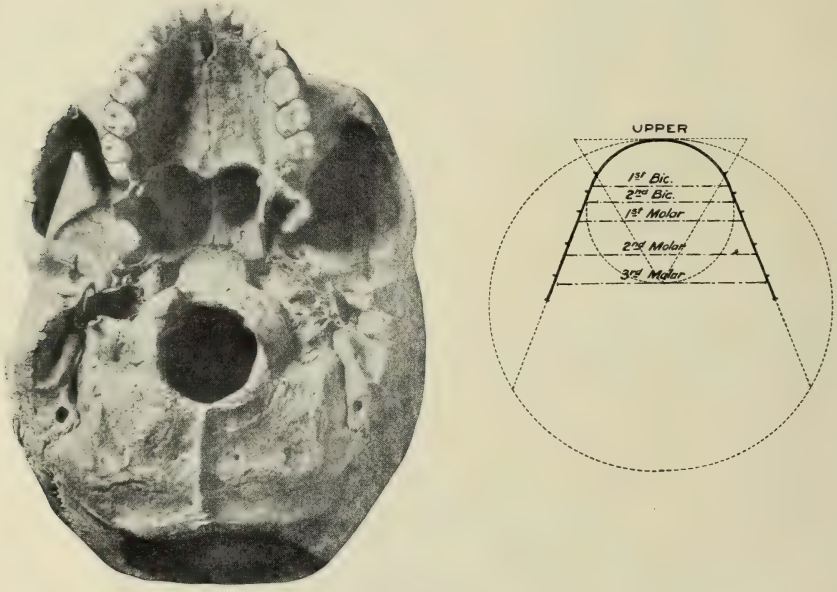


Fig. 11.



one-fourth of an inch longer. The bases of these triangles when measured on shown by the black marks in the photographs. I have had neither time nor

Fig. 12.

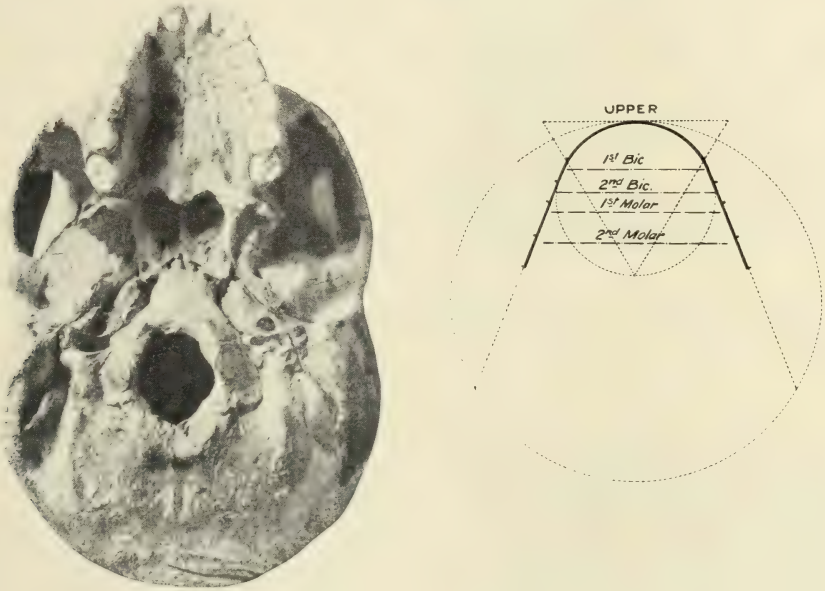


Fig. 13.



their respective skulls each reach from center to center of the glenoid fossa, as opportunity to examine other skulls, but in these two cases the determination of

Fig. 14.



the triangle on which the teeth should be arranged has also determined the distance from center to center of the glenoid fossa. It is also interesting to note that the opening of the posterior nares in the narrow arch is very much smaller than in the normal case.

In Fig. 14 we have casts of the teeth of a man past maturity, in perfect occlusion and an unusually well-developed denture.

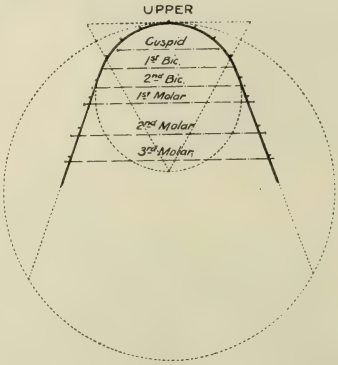
Next (Fig. 15) is the occlusal view and diagram. This arch is five-sixteenths of an inch too wide at the first molars, something very unusual and the only case I have ever seen where both arches were too wide. The diagram locates accurately the trouble. The first bicuspids are in correct positions, the width between the canines too narrow, and back of the first bicuspids all too wide. If this case were to be treated the movement required is accurately indicated.

Fig. 16 shows casts of the teeth of a girl of fourteen, in good occlusion though not fully erupted. But the arch (Fig. 17) is too narrow and some of the teeth are in slight malposition.

To illustrate the application of this method to practical work, I will present four cases. Fig. 18 shows the first case before correction. It is a simple case of class I; it presents no particular difficulty but serves to show the accuracy of working by this method. Fig. 19 shows the case after correction, and Fig. 20 the occlusal views before and after correction, with a diagram of the ideal arch made at the commencement of the work.

Fig. 15.



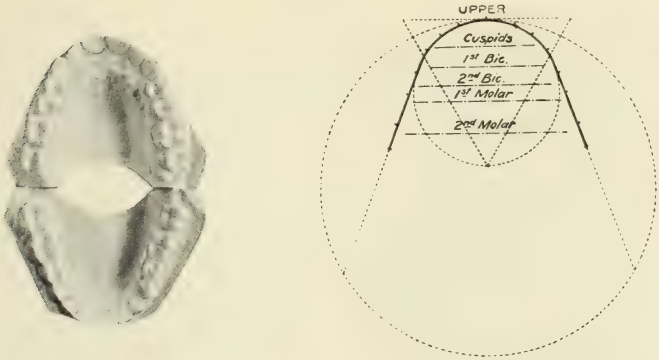


The measurement lines across the molars and bicuspids are taken from the cor-

Fig. 16.



Fig. 17.



rected case. In this case only the skeleton arch was made; in others I have convenient. The diagram indicated that an expansion of one-fourth of an inch

Fig. 18.

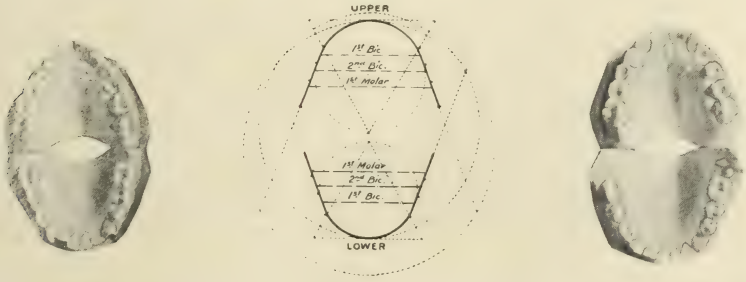


Fig. 19.



drawn in the teeth to give a more natural appearance and also to allow measwas necessary in the molar region. The drawing is kept at hand and at any point

Fig. 20.

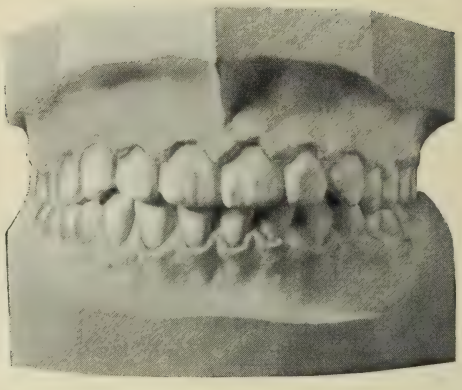


urements to be made from the lingual cusps or any other part of the tooth most in the progress of the work measurements can be taken with a small pair of

Fig. 21.



Fig. 22.



compasses and the exact movement noted by comparing with the diagram. In case the arch needs lengthening, the necessary movement and its progress can be shown by measuring from some point on the molars to the front teeth.

occlusal view of the arches and the working diagram. The expansion in this case was three-sixteenths of an inch. I have chosen this and the preceding case for illustration because in neither of them is the required expansion great, and the mistake might easily be made of not expanding at all. The width of the last

Fig. 23.

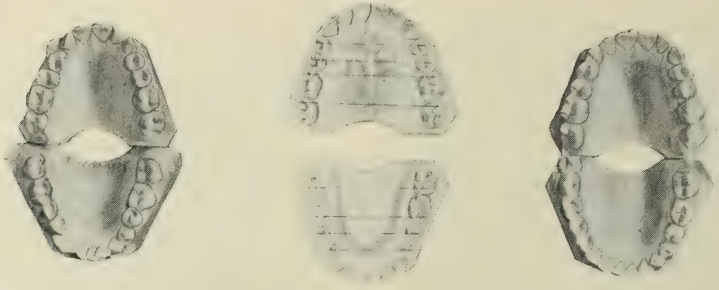
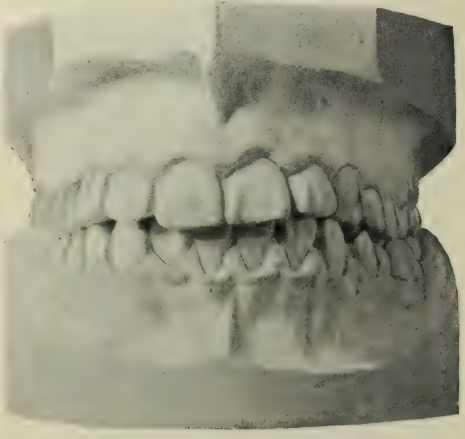


Fig. 24.

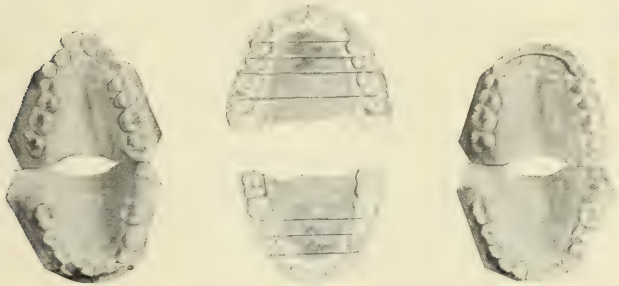


Fig. 25.



Figs. 21, 22 and 23 show the second case before and after correction, with the

FIG. 26.



arch is unusually great when completed, as the distance from crest to crest of the mesio-buccal cusp of the first molars is two and one-fourth inches. The casts of all the finished cases, I may say here, were also taken at the same time, before the teeth were settled into position.

The next case (Figs. 24, 25, and 26) shows more extensive movement. There is great contraction of the arches, and while the molars on both sides are in correct occlusion, the non-eruption of the left second bicuspid has allowed the lower arch to shorten, the left first bicuspid drifting to distal occlusion. In correcting, the diagram gave me not only the normal width of the arches but also the proper length of the lower.

FIG. 27.

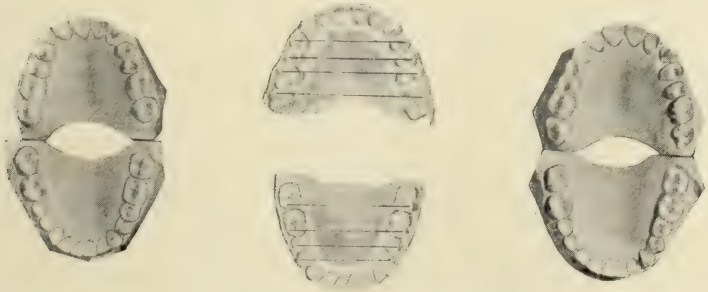


FIG. 28.



Case four (Fig. 27) has some interesting features. The space for the left canine was completely closed and the lower jaw forced back to a position distal to normal, the teeth occluding end to end. The space was opened by carrying the incisors forward and mesially on that side, with the result shown in Fig. 28. The occlusal view shows that the form of the arch was good. The question pre-

FIG. 29.



sented was, "How much larger must the arch be made to accommodate one more tooth?" The diagram (Fig. 29) indicated both the amount of expansion and lengthening exactly, and the movement was accomplished with accuracy and precision.

It is not necessary in estimating the value of this method to contend that the full width of the arch indicated must always be obtained or that any hard and fast rules must be followed. Conditions may justify stopping short of full expansion, but in all cases it is valuable to know the exact form of the normal arch, and then such variations from it may be made as the judgment of the operator indicates. In case of deformed teeth, as for example peg laterals, the size of the upper arch can be determined from the lower, as it is very unusual to find such a deformity in both arches.

Its value in diagnosis is evident and needs little argument. It furnishes an accurate basis for study of any case. Especially by the young operator and student should the method be followed until the normal form of the arch is firmly and accurately fixed in the mind. Even when it is so formed, it is difficult to judge in the mouth with appliances adjusted; but measurements can easily be taken and comparisons made at any time that will give the exact conditions.

ODONTHARMOSIS: A CLASSIFICATION OF THE VARIOUS FORMS OF OCCLUSION OF THE TEETH.

By Dr. JOHN E. GREVERS, Amsterdam, Holland.

(Read before Section VI, Fourth International Dental Congress, St. Louis, Mo., August 31, 1904.)

CARABELLI'S NOMENCLATURE.

AN attempt to classify the various forms of occlusion of the teeth has now and then been made, with, however, varying results. The first published classification was by Carabelli, who in his "Systematic Handbook of Dental Surgery" (Vienna, 1844) enumerated and described six forms. As the Latin language does not possess a word equivalent to "bite," Carabelli introduced the term "mordex," from *mordere,* to bite. He designated the normal bite as *Mordex normalis,* the edge-to-edge bite as *M. rectus,* the open bite as *M. apertus,* the protruding bite as *M. prorsus,* the retruding bite as *M. retrorsus,* and the cross bite as *M. tortuosus.*

This classification was undoubtedly a step in advance; yet it did not meet with the approval of his contemporaries, as we do not find it adopted in their writings. The reason for this is not far to seek, inasmuch as this system is not free from contradictions.

In his fourth group, *Mordex prorsus,* we find the protruding jaw defined, *i.e.* protrusion of the upper or of the lower jaw (Pl. XXVI, fig. 182, and Pl. XXVII, fig. 1); and in the next group, *Mordex retrorsus,* are collected cases which are known as edge-to-edge bite and also as protrusion of the lower jaw (Pl. XXVIII, fig. 2, and Pl. XXIX, fig. 1). These are definitions which do not conduce to a clear understanding of the subject.

In 1880 Oakley Coles read a paper before the Odontological Society of Great Britain on "The Deformities of the Upper Jaw: an Attempted Classification of Them." As his paper, however, treats only of the deformities of the upper jaw, we can leave his classification out of the discussion.

STERNFELD'S NOMENCLATURE.

Exactly forty-four years after Carabelli a book on the same subject was published by Sternfeld, "Bissarten und

Bissanomalien" (forms of bite and anomalies of bite); and in 1891 the same author published an article on "Anomalien der Zähne" in Scheff's *Handbook of Dental Surgery.*

In the last-named article Sternfeld introduces a nomenclature which has for its basis terms employed in anthropology. He recognizes two classes of occlusion—a physiological or ethnological, and a pathological.

The first class, the ETHNOLOGICAL, comprises the following named species: (I) *Orthognathia dentalis:* Normal bite. (II) *Prognathia ethnologica:* Prognathism. The same condition exists here as in (I), with the difference that here the maxillary teeth have a forward direction. (III) *Orthogeneia ethnologica:* Edge-to-edge bite. (IV) *Progeneia ethnologica:* Protrusion of the mandible.

Under the PATHOLOGICAL forms of occlusion Sternfeld ranges the following: (I) *Prognathia pathologica:* Protrusion of the maxilla. (II) *Orthogeneia pathologica:* Pathological edge-to-edge bite —which he says is very rare. (III) *Orthognathia pathologica:* Pathological normal bite—which is also seldom met with. (IV) *Progeneia pathologica:* Pathological protrusion of the lower jaw; not rare. (V) *Opisthogeneia:* Retrusion of the mandible. (VI) *Opisthognathia:* Retrusion of the maxilla.

By combining two distinct forms of anomalies, expression can be given to certain sub-forms, *e.g.* a retrusion of the maxilla (opisthognathia) with a protrusion of the lower (progeneia), *i.e.* progeneic opisthognathism.

In general, Sternfeld applies the term "gnathia" for the upper and "geneia" for the lower jaw, and uses the prefixes "ortho-," "opistho-," and "pro(s)-" to indicate the position of the teeth, whether straight, backward, or forward.

This nomenclature would be acceptable if it could be proved that the pathological forms here given are exaggerations of the ethnological or physical forms, and moreover, that the ethnological forms also are indeed fixed and racial characteristics.

We believe that exception must be taken to the fourth ethnological group—*Progeneia ethnologica*—protrusion of the lower jaw. The facts brought forward to establish the existence of a physiological or ethnological progeneia are doubtful, to say the least.

Sternfeld cites as an example of ethnological progeneia the ancient Frisians, and gives this on the authority of Virchow, who in his "Beiträge zur Physischen Anthropologie der Deutschen, mit besonderer Berucksichtigung der Friezen" (contribution to the physical anthropology of the Germans, with special reference to the Frisians), 1877, claims for the ancient Frisians protrusion of the lower jaw as a racial characteristic, and in support of his conclusions gives a few drawings of ancient skulls (pp. 178, 181, 289, and Pl. I and II). In the text, however, we find some passages which make it extremely doubtful whether the conclusions of Virchow are correct. On page 63, in describing two skulls belonging to the island of Marken, Virchow admits that they have "lower jaws which are fairly fitting;" again on page 63, "—discarding the lower jaw, which probably does not belong to skull No. 15 (Plate I, fig. 1);" and again on page 68, "The fairly fitting lower jaw (skull No. 16, Plate II, fig. 1) in regard to form and teeth disharmonizes so much in color and other appearances that it is doubtful if it belongs to the skull."

From personal study of these skulls I fully agree with Virchow, and do not hesitate to declare that the mandible does not belong to the skull, and that from these skulls it cannot be concluded that the Frisians were ethnologically a progeneic race. An ancient Frisian skull found in a "terp," in my possession, on the contrary, shows unmistakable evidence of orthogeneia ethnologica—edge-to-edge bite. From a trustworthy source I learn that the collection of skulls of ancient Frisians found in the provincial museum in Leeuwarden show that the ancient Frisians had an edge-to-edge bite, and must in this characteristic be classified with the Egyptians and Celts, which Sternfeld arranges under class

III. Of twenty-one skulls of ancient Egyptians measured by me in the anthropological museum in the Jardin des Plantes in Paris, I found six with normal bite (orthognathia dentalis), two with protrusion of the upper jaw, and thirteen with edge-to-edge bite.

It is therefore extremely doubtful that a protruding mandible is here an ethnological fact.

Moreover, the term "progeneia" is not a precise and definite one. This term —or "progenæa"—originated with L. Meyer ("Ueber Crania progenæa, etc.," *Arch. f. Psychiatrie,* vol. i, Nos. 1 and 2, 1868), who had found among the inmates of insane asylums typical cases of protruding mandible which were connected with a certain form of insanity, and to Meyer were pathognomonic.

By comparing the drawing which accompanies Meyer's article with the illustrations given by Virchow of protruding mandible we come to the conclusion that the two authors attach a different meaning to this term. Meyer's case shows a decided protrusion of the mandible—so much so that the lower front teeth bite in front of the upper ones, while in Virchow's cases they meet edge to edge. But we must not forget that the mandibles described by Virchow did not belong to the skulls to which they are assigned.

But a serious objection must be raised against the classification of Sternfeld, inasmuch as there is no room for that class of pathological occlusion of teeth which we call open and cross bites; and it is not improbably owing to this incompleteness that Sternfeld's system is not in general use by our profession.

A GOOD CLASSIFICATION A PRESENT NEED.

That a good classification is greatly needed now that the science of orthodontia is broadening and growing will be acceded to by every practitioner, and in particular by the teachers of orthodontia.

Angle, in the sixth edition of his "Treatment of Malocclusion of the Teeth," gives a good working classification. He divides the cases of malocclusion in three classes with divisions and subdivisions. Class I comprises the normal bite: Arches in normal mesio-distal relation. Class II: Protrusion of the maxilla: Lower arch distal to normal in its relation to upper arch. Division 1: Bilaterally distal, protruding upper incisors. Subdivision: Unilaterally distal, protruding upper incisors. Division 2: Bilaterally distal, retruding upper incisors. Subdivision: Unilaterally distal, retruding upper incisors. Class III: Protrusion of the mandible: Lower arch mesial to normal in its relation to upper arch. Division: Bilaterally mesial. Subdivision: Unilaterally mesial.

This system works well for studying the treatment to be instituted; it has, however, the great drawback that it does not include every variety of malocclusion and does not appeal to the imagination.

ISZLAY'S NOMENCLATURE.

We believe—and an extended experience has proved it—that we have an excellent and logical classification in that which was introduced by Iszlay in 1881 and 1891.

Before the dental section of the International Medical Congress held in London in 1881, Iszlay read a paper entitled "Illustrative Skizzen in Carabelli's *Mordex prorsus* und dessen Verhältniss zur sogenannten *Prognathia ethnologica* und Meyer's *Crania progenæa,*" in which the author proposes a new nomenclature for the forms of malocclusion.

Ten years later, in 1891, Iszlay published a short paper on the same subject in the Austro-Hungarian *Quarterly Journal of Dental Surgery,* which paper may be considered a revised and condensed edition of that which he read in 1881.

The nomenclature therein proposed, according to my experience, is not only correct, but is above all a highly practical one, which upon its once becoming generally accepted will be of great value in discussions, etc., conveying as it does a clear definition of each particular form of malocclusion.

To do away with a term which we all acknowledge to be incorrect—a mis-

nomer—"articulation of the teeth," Iszlay proposes the term odontharmosis, from ὀδοὺς, tooth, and ἁρμοζεῖν, ἅρμοσις —joining, fitting.

Now, in order to be able to determine the variations in odontharmosis it is desirable to find a fixed or quasi-fixed point. For this purpose the upper teeth have been selected; in other words, the relation of the position of the teeth of the lower jaw to those of the upper. According to this position we may have the following chief forms:

(I) The front teeth of the lower jaw strike back of the upper teeth: Normal bite: *Enarmosis.*

(II) The front teeth of the lower jaw strike in front of the upper: Protrusion of the lower teeth: *Epharmosis.*

(III) The cutting edges of the lower teeth meet the same edges of the upper teeth: Edge-to-edge bite: *Prosarmosis.*

(IV) Between the upper and lower teeth there is an open space: Open bite: *Opharmosis.*

(V) The lower teeth cross the upper teeth: Cross bite: *Dicharmosis.*

(VI) The odontharmosis is mixed up: Mixed bite: *Tyrpharmosis.*

Genus I. *Enarmosis* (ἐν ἁρμόζω): Normal bite. The teeth of the mandible strike back of the lingual surface of the upper teeth, leaving hardly any space between them, the teeth of the mandible being overlapped by those of the maxilla by one or two millimeters.

Species 1. The same relationship as preceding, with the difference that there is a greater distance between the labial surfaces of the lower teeth and lingual surfaces of the upper teeth: Protrusion of the upper teeth: *Di-enarmosis* (διὰ, away from).

Species 2. The same relationship as in species 1, with the difference that the lower teeth are here overlapped to a greater extent by the upper teeth: Deep bite: *Dys-enarmosis* (δὺς, wrong).

Both classes appear either separate or combined; in the latter case we have protrusion with a deep bite: *Dys-di-enarmosis.*

Genus II. *Epharmosis* (ἐπὶ ἁρμόζω): Protrusion of lower teeth. Here the relationship between the lower and the upper teeth is reversed. The lower teeth stand in front of the upper and are overlapped by the upper teeth to the extent of one or two millimeters.

Species 1. The same as species 1, genus I, but reversed: Protrusion of the lower teeth, but being greater it is called *di-epharmosis.*

Species 2. The same as species 2, genus I, but reversed: Deep bite with lower teeth in front—*dys-epharmosis.* Where both species are combined we have more or less protrusion with a deep bite: *Dys-di-epharmosis.*

Genus III. *Prosarmosis* (πρὸς ἅρμοσις): Edge-to-edge bite. It comprises those cases where the cutting edges of the lower teeth meet the cutting edges of the upper. (No species.)

Genus IV. *Opharmosis* (ὀπὴ ἅρμοσις): Open bite. Here are included those cases where on closing the mouth the molars and premolars or the molars alone meet, leaving an opening between the front teeth. (No species.)

Genus V. *Dicharmosis* (δίχα ἅρμοσις): Divided, cross bite. Characterized by a combination of the foregoing genuses; one side may be enarmotic, the other epharmotic, etc.

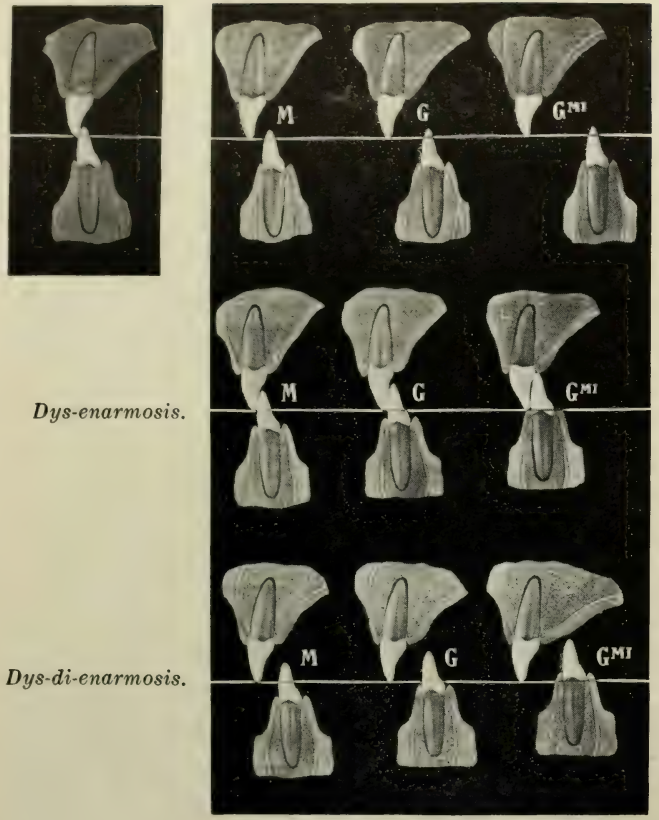
Genus VI. *Tyrpharmosis* (τύρβη): Mixed bite. Here the odontharmosis is so mixed up that it cannot be grouped under any of the genuses enumerated, either in one or two combinations.

By critically studying this system it becomes evident that the two last-mentioned genuses cannot be admitted as such; that they are nothing else than combinations of the preceding groups; nevertheless the terms are practical.

The system of Iszlay as presented to us in 1891, and given above, did not work satisfactorily, it seemed to me, when applying it for practical purposes in various museums, failing to cover all cases of malocclusion and needing extension.

While visiting Dr. Iszlay in Budapest this incompleteness was pointed out, and

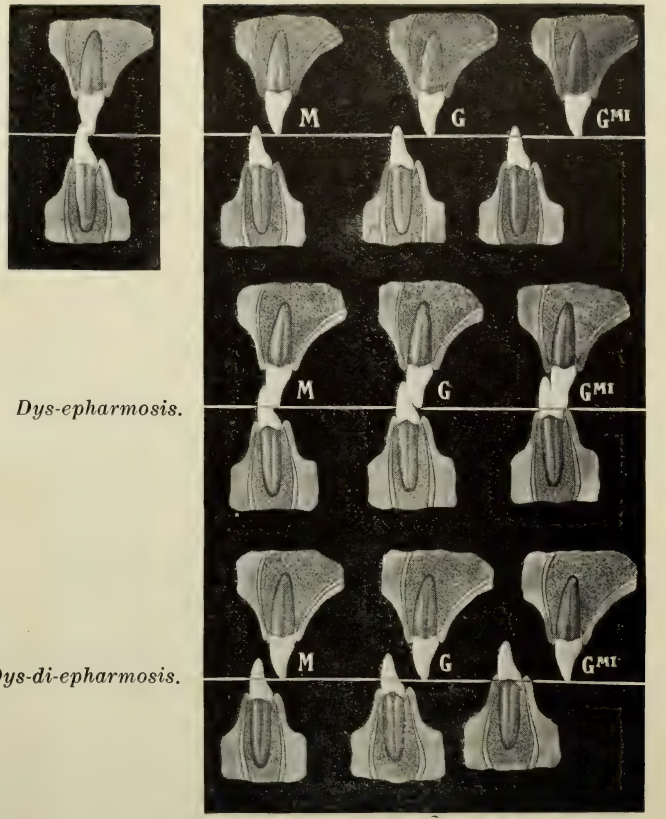
ENARMOSIS. *Di-enarmosis.*



Dys-enarmosis.

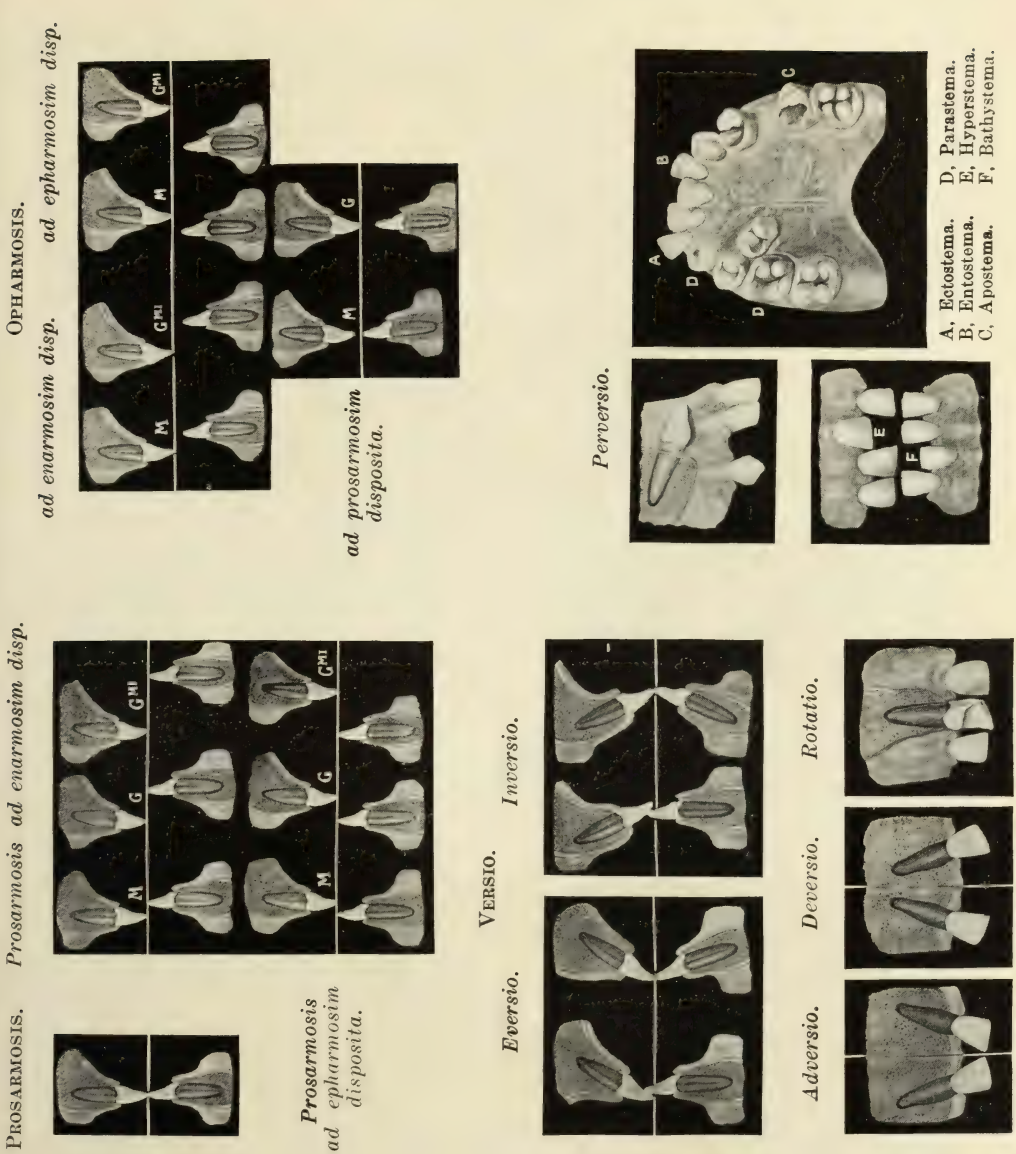
Dys-di-enarmosis.

EPHARMOSIS. *Di-epharmosis.*



Dys-epharmosis.

Dys-di-epharmosis.



we set about to remedy the objections that might be raised to a nomenclature otherwise so admirable. With the assistance of a large collection of lantern slides we came to the conclusion that the system needed to be developed, and that this could be done without changing it as first proposed; and we found that we had in the first four genuses all the elements necessary to classify every form of odontharmosis by making a varied combination of these four groups.

The following classification is now proposed:

PROPOSED NOMENCLATURE.

I. Enarmosis.

(A) *Eu-enarmosis:* Normal bite.

(B) *Di-enarmosis:* Protrusion of upper jaw. (*Levis, mediocris, gravis, gravissima.*)

(C) *Dys-enarmosis:* Deep bite. (*Levis, mediocris, gravis, gravissima.*)

(D) *Dys-di-enarmosis:* Protrusion with deep bite. (*Levis, mediocris, gravis, gravissima.*)

II. Epharmosis.

(A) *Eu-epharmosis:* Protrusion of lower jaw is minimum.

(B) *Di-epharmosis:* Protrusion of lower jaw. (*Levis, mediocris, gravis, gravissima.*)

(C) *Dys-epharmosis:* Protrusion (slight) with deep bite. (*Levis, mediocris, gravis, gravissima.*)

(D) *Dys-di-epharmosis:* Protrusion with deep bite. (*Levis, mediocris, gravis, gravissima.*)

III. Prosarmosis.

(A) *Prosarmosis simplex sive eu-prosarmosis:* Edge-to-edge bite.

species.

(1) *Prosarmosis ad enarmosim disposita.*

(2) *Prosarmosis ad epharmosim disposita.*

(3) *Prosarmosis ad di-enarmosim.* (*Levem, mediocrem, gravem, gravissimam.*)

(4) *Prosarmosis ad di-epharmosim.* (*Levem, mediocrem, gravem, gravissimam; disposita.*)

IV. Opharmosis. (Open bite.)

species.

(1) *Opharmosis ad prosarmosim disposita.* (*Levis, mediocris, gravis, gravissima.*)

(2) *Opharmosis ad enarmosim disposita.* (*Levis, mediocris, gravis, gravissima.*)

(3) *Opharmosis ad epharmosim disposita.* (*Levis, mediocris, gravis, gravissima.*)

(4) *Opharmosis ad di-enarmosim.* (*Levem, mediocrem, gravem, gravissimam; disposita.*)

(5) *Opharmosis ad di-epharmosim.* (*Levem, mediocrem, gravem, gravissimam; disposita.*)

V. Dicharmosis.

VI. Tyrpharmosis.

In determining malocclusion it is of very great importance that a study be made of each particular case; that the relation of the lower teeth to the upper be closely examined; and, above all, that a study be made of the direction of the teeth. When this is neglected a wrong diagnosis will be the result and this system will not work.

Many cases classified as protrusion—or, as some call it, prognathism—are nothing else than cases of eversion (anteversion, Magitot), which has nothing in common with di-enarmosis or prognathism, and as a rule is the result of thumb- or tongue-sucking or other disturbing habit, by which the teeth are turned in the direction of their long axes; again, a deep bite through loss of the molars and premature extraction of the four first molars is often responsible for the eversion of the front teeth. Where we find eversion connected with an opening between the lower and the upper teeth we have an opharmosis with eversion of the incisors—cases which we often meet with in practice.

To eversion must be attributed what the French school of anthropologists terms *prognathisme alvéolo-sous-nasal.*

AN ARTIFICIAL NOSE FOR A CHINAMAN.

By LOUIS OTTOFY, D.D.S., Manila, P. I.

WEE CHEONG, the subject of this article, claims to have lost his nose when he was a child, as the result of a blow inflicted by a playmate. There is nothing extraordinary about the substitute which I made for him, except that it is the first work of this kind in the Philippine Islands, and possibly the first substitute of its kind ever made for and worn by a native of the celestial kingdom.

The substitute is retained in position by the spectacles above and by two small rubber hooks extending into the nostrils below. It is made of vulcanite and has been artistically painted by a famous native portrait artist. He has reproduced the color—a muddy yellow—to perfection, and added some of the defects of other portions of the face in the form of discoloration of the skin, which, however, does not show in the illustrations.

The photographs (unlike most of those which I have seen) from which the illustrations are made have not been recognized, and it is, indeed, discernible only on close inspection, the deception being aided by the fact that of all things

Fig. 1.

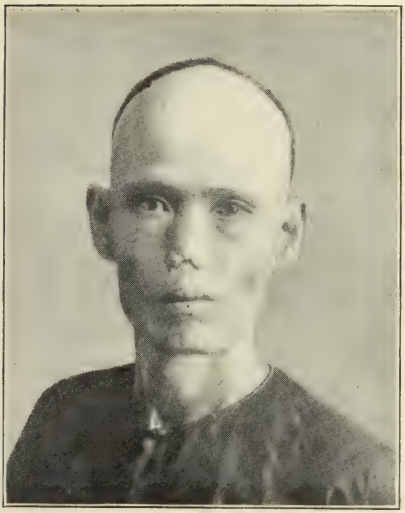
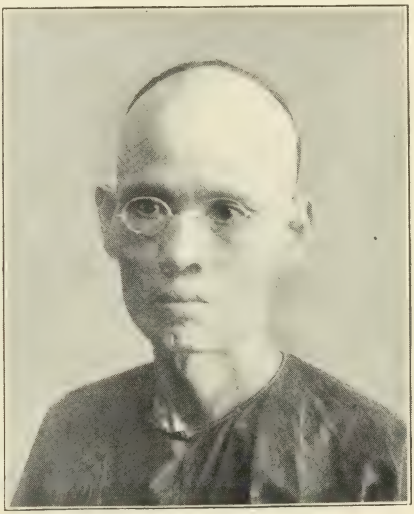


Fig. 2.



touched in the slightest degree, and the partly imperfect adaptation of the lower portion of the piece is shown as it really

the last to look for on a Chinaman's face is an artificial nose. The man without the piece is extremely repulsive.

Fig. 3.

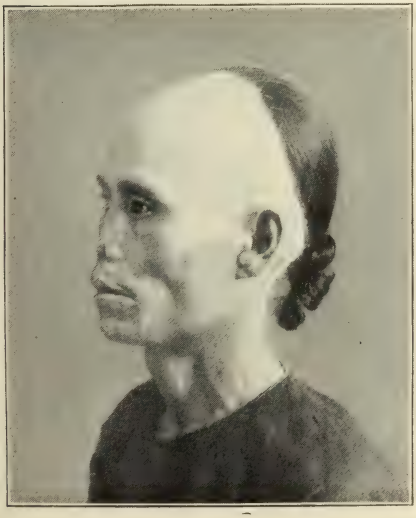
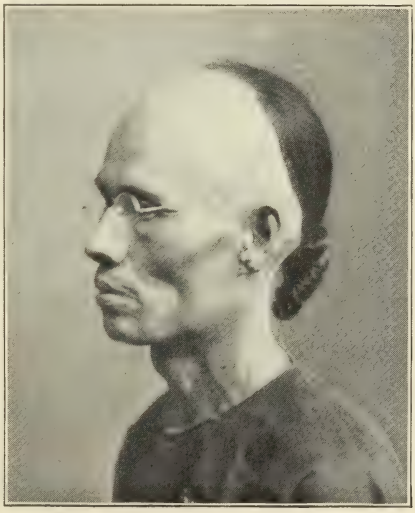


Fig. 4.



exists. This is due to the fact that the remains of the nostrils are very small, and admitted of but little attachment. Within ten feet the substitute cannot be

Anyone who is observant, will have noticed in Manila that such injuries as the loss of arms and legs are extremely rare, due to the absence of factories.

street-cars, railroads, etc. The only railroad in the islands runs its trains slowly, and only in daytime, there being no night trains. On the other hand, repulsive defects of the face, the loss of large portions of the soft tissues, including the nose, hare-lip, etc., seem to be met with greater frequency. I am of the opinion that this is not necessarily due to a larger number of these cases, but to the fact that no remedy is applied, and the loss sustained is often greater than would be the case in almost any part of the United States or elsewhere, where surgical aid would intervene. Practically nothing has been done here to remedy hare-lip in early age; and other affections of the face usually terminate by exhaustion rather than surgical or medical interference.

AN ARTIFICIAL NOSE.

By W. H. BAIRD, D.D.S., Burlington, Iowa.

MRS. S. called to consult me in regard to the making of an artificial nose, the external organ having been destroyed by cancer, which affection, I was told, had been cured some two years previously. I found the parts all normal otherwise.

The first step consisted in taking an impression with plaster of Paris, forcing it well up into the nares and using care not to permit the plaster to run down on the floor. I then made a model over the mold, waxed up the base or framework, formed the bridge, and vulcanized with black rubber. At the top of the bridge I waxed up a thin piece upon which to hold the nose in proper position to take the last impression.

Having my base in position, I marked the place to insert the gold springs which were to hold the nose in place.

FIG. 1.



FIG. 2.



The next step was the shaping of the nose. I used wax about $\frac{3}{8}$ of an inch thick for this, extending well out at the sides. Having these materials in place and the patient's face well oiled, I warmed the wax so that the stem of the black rubber base held it while I pressed

or drew the thin wax to a proper adaptation to the face. At this point occurs the main difficulty of proper restoration. I overcame this by oiling the parts as I took the last impression, removing the restored parts and the black rubber base. A model was made from the base.

Holes were drilled into the surface of the black base to the thin pink rubber which was used for the finishing where the nose united to the face-piece. It was then vulcanized at a low point. Afterward the gold springs were set in place. This was all new work for me, yet the result is just as the photograph shows, and even better in appearance than is here shown. The facial touches were made by Mr. Geo. Harvey, an artist, who painted the nose to correspond to the appearance of the other features. One peculiarity was a congested vein which the artist blended so skilfully that it had its ending inconspicuously merged into the artificial nose.

AN ARTIFICIAL NOSE AND PALATE.

By LEE BAKER, D.D.S., Port Townsend, Wash.

THE subject is Miss E. T. of Friday Harbor, Wash., a girl sixteen years old, being one of a family of seven—four girls and three boys—and the only one that shows the slightest disfigurement by catarrhal trouble, which at the age of nine years developed and went steadily on until the entire nose and palate bone were eaten away. She was twelve years old when cured, and about sixteen when I met her in 1895.

I first saw her on the steamer "Lydia Thompson," coming from Friday Harbor. It appeared to me that something might be done for her. I inquired her name of the purser. I was no better off than before, for she could not speak plain enough to be understood by him. A month later, being near her home, I inquired her name of the neighbors, and sent word to her parents to bring the girl to me at the hotel where I had my

FIG. 1.



FIG. 2.



office. After making a careful examination I concluded that an artificial nose and palate could be made. I brought her with me to Port Townsend and kept her one month.

The illustrations show her first condition (Fig. 1) and the result when finished (Fig. 2); I present also a photograph taken six years later (Fig. 3). The upper right second and third molars and the upper left third molar were the only remaining teeth. There is a portion of the palate bone left on both sides running back to the soft palate; the incisor portion is entirely gone, and part of the maxilla as far back as the canine eminence, as well as the nasal bone, which leaves the flesh covering only the maxillæ and the lip, the entire portion of the nasal cavity and palate being hollow. The soft tissue of the lip had so enlarged that it filled the entire portion between the points of the maxillæ. The enlarged parts were so thick that the lip stuck out, and I had to remedy that before the plate could be made. The plate has a slot over the central incisor region one-half inch long, one inch deep, one-half inch wide, to accommodate the enlarged parts of the lip. The plate was made in the usual shape, with a dome added to the palate side one inch in height and beveled so that it fills the entire portion of the palate which is missing. It has a flare, which makes it fit very tight. A notch in the rim of the plate receives one of the springs that holds the nose; the other spring fits in under the frontal bone. These springs hold the nose very steady. The glasses are not necessary, being provided merely to take off the artificial effect. The nose is made of vulcanized rubber and colored by paint, and was made from a wax impression of a nose that I thought would fit the case. I then put the bridge in and adjusted the springs to fit it to the face. She has worn it continually ever since. The glasses she wears were made from a model constructed by me. A

Fig. 3.



wide nose-piece runs down the side to cover the union between the nose and the face, giving a very natural effect.

Miss T. is very proud of the work, being able to talk and sing as well as most persons. Before this work was done she continually complained that the cold air kept the soft tissues so inflamed that she suffered a great deal of pain. Since this work was finished the tissues have been in their normal condition. Her health is much better than formerly and she has so increased in weight that one would not know her to be the same person.

THE USE OF FORMALIN FOR HARDENING THE DENTAL PULP.

By J. I. HART, D.D.S., New York City, N. Y.

(Read at the tenth annual meeting of the Northeastern Dental Association, Hartford, Conn., October 19, 1904.)

ONE of the most exacting operations we are called upon to perform is the removal of the dental pulp from fine, tortuous root-canals. If this operation is successfully performed under aseptic conditions the result is a useful root, otherwise it will eventuate in chronic pericementitis and probably the loss of the tooth.

Various methods have been suggested for the painless removal of the dental pulp. First, Spooner suggested the use of arsenic for its devitalization; more recently we have employed pressure anesthesia and removed it painlessly while thus anesthetized. The main objection to its removal while vital is, that we have usually encountered a persistent hemorrhage that is somewhat difficult to control, and owing to the consistence of the pulp it is difficult to remove it *en masse*.

Dr. Harlan, as you all know, has suggested a method of digesting the pulp after its devitalization, but in my hands this is not so satisfactory as is the hardening of the pulp by the use of formalin. When this is accomplished we render the consistence of such a character that the pulp is readily withdrawn.

The substance known as formaldehyd was first discovered by Van Hoffman in 1867, who obtained it by passing a vapor of wood alcohol mixed with air over finely divided platinum sponge heated to redness. Formalin is a 40 per cent. solution of chemically pure formaldehyd gas in water. Formaldehyd or formic aldehyd is a gaseous compound formed in small quantities, together with formic acid and marsh gas, by the action of static electric discharges on a mixture of hydrogen and carbon dioxid. Investigation by the celebrated chemist Baeyer points to formaldehyd as the natural protector of the tender parts of plants, it being generated by the action of sunlight on the carbonic acid and water of the air in the presence of the green coloring matter of leaves. Formaldehyd gas possesses very high germicidal properties, destroying micro-organisms even in attenuated solutions. It is neutral, being neither acid nor alkaline. The vapor is extremely pungent and very irritating to the eyes and mucous membrane of the nose and throat. As weak solutions are effective and stronger ones so irritating, we should confine our use of it to solutions not stronger than 5 per cent. Formalin mixes with water in all proportions; it therefore becomes a simple matter to prepare any dilution desired. Dr. G. Bergonzoli (*Bull. Scientifico*) states that he has "found from his observation that solutions of formalin are deodorant and disinfectant, and that pieces of tissue immersed in it are rapidly fixed and hardened."

With regard to the employment of formalin as a hardening agent for animal tissues, Dr. McAdam Eccles of the West London Hospital (*Brit. Med. Journal*) calls attention to the usefulness of this adjunct in pathological and histological work. From his experience, formalin in from 10 per cent. to 20 per cent. solution acts as a most satisfactory and rapid hardening agent. Although hardening is effected very rapidly by such concentrated solutions, I prefer to use a weaker solution, allowing a longer time for its action. The hardening effect of formalin is dependent on a coagulation of the protoplasm by the vapors that are absorbed. The desire to harden the pulp has lat-

terly been manifested by the addition of tannin to the arsenic in the formulas suggested for pulp-devitalization, but its effect has been at best indifferent; with formalin, however, the change is most marked.

My method is to apply arsenic fiber to the exposed pulp, if not inflamed, for from 24 to 48 hours, and then under aseptic precautions to remove the bulbous portion of the pulp and place in contact with the stump a 5 per cent. solution of formalin. This is left in contact and sealed in for three days, when we find the pulp of the consistence of catgut and readily removed with the pliers. I have purposely refrained from any description of the application of the arsenic, the technique of the extirpation of the pulp, or the obliteration of the space, as you are familiar with these topics, and I hesitate about taking up valuable time in the consideration of matters already well understood.

CIVILIZATION AS A FACTOR IN THE ATROPHY AND DISAPPEARANCE OF THE THIRD MOLAR.

By Dr. JUAN FALERO,
PROFESSOR OF OPERATIVE DENTISTRY, MEXICAN DENTAL COLLEGE, CITY OF MEXICO.

(Presented to Section II, Fourth International Dental Congress, St. Louis, Mo., September 1, 1904.)

IF any change whatever in the functions of an organ be sufficient to excite the attention of thinking men and induce them to undertake investigations as to the causes of that change, with much greater reason should they study the disappearance of an organ, however insignificant it may appear.

I am alluding to the disappearance of the third molar or "wisdom tooth," the presence of which has up to the present been considered permanent in spite of the fact that our daily observation proves the contrary.

As a matter of fact, this molar was never wanting in the primitive races; at least it is so asserted by all authors who have studied the matter, and the skulls of the ancient Egyptians as well as those that are preserved in the different museums of Europe prove the existence of this organ in all adults who had passed the age of twenty-five years.

We who live in Mexico find ourselves in a specially favorable condition to observe a change that is taking place in our organism, and to which I desire to call the attention of this learned gathering. I say that we are in specially favorable surroundings, because here we have before our eyes an Indian race in all its purity, whose magnificent teeth we can admire and compare with those of their descendants of mixed race and with those of the natives of Europe who reside among us.

In the magnificent collection of ancient skulls that is to be found in our National Museum we have seen this molar in all developed jaws, and in more than 2000 mouths of Indians whom we have examined in the states of Yucatan, Campeche, Tobasco, Chiapas, Vera Cruz, Oaxaca, and Puebla we found only one in which this tooth was not fully developed. With the single exception noted, I found the third molar in good condition, and neither badly formed nor out of place, as frequently happens among ourselves.

Among the Europeans or their descendants whom we daily attend in the work of our offices hardly seventy-five per cent. possess these molars, and it is noted that when they have these teeth they are seldom in good condition. They rarely have the four—the natural number—while many have only two, generally the lower ones.

In view of this deficiency or omission

it occurs to us to ask whether it is not to be attributed to our way of living and to the slight use we make of our teeth.

It is well known that the Indian seldom makes use of condiments to flavor his food, that this food is always the same—being very simple, rather cold than hot—and that he uses no further appliances than his own teeth and jaws. In fact, his teeth are for him real knives, with which he cuts meat, peels sugarcane, cuts string, or picks bones; of his molars we can say that they are true mills which pulverize everything that comes within their reach. In addition to this function the Indian makes use of his jaws as if they were a third hand; he employs them to hold the reins of his horse, to support his clothing and arms while fording rivers, to graduate the weight of a load by lifting it first with his teeth, and so throughout the whole round of occupations. We can easily understand that such exercise is conducive to great development of his jaws, in which the teeth are well rooted and have sufficient space for their full and free development.

If we accept as a scientific truth that the functions fulfilled by any organs—that is to say their exercise—develop and strengthen them, while the want of exercise debilitates and atrophies them, we find an eloquent argument for this theory in the teeth.

It is a fact that our teeth are far from executing the work for which nature has designed them. Our food is brought to the table in a state of soft preparation, due to the cooking to which it is previously subjected and to the division we make of it with a knife; the teeth therefore really fulfill a secondary office. This want of exercise appears to me to be the determining cause of the atrophy of our molars and jaws, and, consequently, of the lack of space to allow the development of the third molar.

If to this we add that the Indian is naturally sober, is beyond the great emotions connected with civilized life, leads a tranquil life, retires early, does not smoke, is exempt from syphilis, we may consider all these circumstances favorable to the prevention of that debilitation of the organism so often found in civilized races. These factors constitute proof, further, that customs and habits exercise great influence in the development and preservation of the teeth.

During the existence of slavery in Cuba the African negroes employed on the plantations were exceedingly muscular, and although treated like animals were otherwise obliged to lead a quiet and methodical life, and consequently never suffered from caries; now, however, while they lead a civilized life, and especially so in the cities, they have lost their vigor, and most of them are victims of syphilis; and their teeth, which formerly could be taken as models of texture and beauty, now suffer from caries just as much as those of civilized persons.

I therefore come to the following conclusions:

(1) The third molar is always found in the Indian at the age of twenty years in as well developed a condition as any of the other teeth, and it makes its appearance as an entirely physiological act without any difficulty whatever.

(2) The third molar is also invariably found in the halfbreeds, but it does not appear as early as in the Indian, often not before the age of twenty-five years. Moreover, its eruption does not take place in a normal manner as in the Indian, since it is frequently accompanied by more or less intense inflammation due to the effort made by the tooth to occupy its proper place in the jaw.

(3) The third molar is an organ that is not invariably found in Europeans or their descendants, as it is possessed by only seventy-five per cent. of them, and then in a defective form and more or less out of place, while its duration is shorter than in the races above mentioned. As in the Indian and halfbreed, this tooth commences to erupt at the age of eighteen, but with Europeans and their descendants it does not complete its development before the age of thirty. In the latter case the eruption is often accompanied by facial neuralgia, inflammation, abscess, and fever, all which

disorders are caused by want of space in the jaw and pressure of the organ on the tissues in its endeavor to occupy its proper place. This want of space is at times so evident that the extraction of the previous molar becomes necessary, and cases have been known in which the third molar has remained buried within the jaw on account of the entire want of space within which it could appear.

The truth is that we have never seen in an Indian a case of trismus, or any other complication whatever that could be attributed to any difficulty in the eruption of the third molar, while in Europeans disorders accompanying its eruption are frequent, and sometimes assume a serious character.

If, therefore, the same case assumes such distinct characteristics according to the origin of the person, to what must we attribute this difference?

In the Indian the eruption of the third molar is an entirely normal and physiological evolution without any pathological consequences of any kind, while in the European it is the frequent cause of more or less serious disorders.

CORRESPONDENCE.

A STERILIZING BATH FOR STEEL INSTRUMENTS.

To the Editor of the Dental Cosmos:

Sir,—In the March issue of the Cosmos you published an interesting and valuable paper by Dr. R. Ottolengui—"A Contribution to the Study of Sterilization, with Special Reference to the Work of the Dentist."

In this paper Dr. Ottolengui very truly says, "The canal broach is at once the most difficult instrument to thoroughly sterilize, while being the one of all used by dentists which most requires aseptic precautions at our hands." We are then told something about how broaches are made and packed, and a little farther on Dr. Ottolengui asks, "Can we find a good germicidal fluid in which steel instruments may be kept without injury and with the assurance that asepsis will be attained?"

It is the purpose of this communication to call attention to a fluid which, I believe, perfectly fulfills the above requirements. This fluid, which I have used for several years with great satisfaction, is a saturated solution of borax in twenty per cent. solution of formalin. It is practically an instantaneous germicide, and it not only will not injure steel instruments but it is the best thing for preventing rust that I have ever used. I inclose a small bur which has been kept for more than six months in this fluid. You will see that it is perfectly free from rust and untarnished. The fluid is not my discovery and I cannot tell now when or where I first heard of it; but I take this opportunity of returning my most cordial thanks to the inventor.

I have a large glass jar with cover, holding about a gallon, standing near my chair. A sufficient quantity of the fluid is put into the jar to cover excavators, scalers, etc., and then I throw a handful or two of pulverized borax into the liquid. I always put more borax in than the liquid will dissolve. Into this jar all burs and small steel instruments, rubber dam clamps, etc., are thrown and left until it is convenient to take them out. Many instruments are left here until they are wanted for use again. If forceps or any jointed instrument be sterilized in this fluid it must be carefully rinsed in hot water to remove the borax from the joint.

With reference to the use of broaches, I may say that as I never use any other

than a soft broach, I find the most convenient and effective method of sterilizing is to pass the broach through the flame of the alcohol lamp just before using it. The broach should be held a little above the flame to avoid burning it and not be withdrawn from the heat too quickly, otherwise the sudden cooling will harden it.

While on this subject I may be allowed to add that in the treatment of root-canals I think one very important point is too frequently overlooked. Of almost equal importance with the destruction of bacteria is the removal or neutralization of the poisonous products of bacterial action, and for this purpose no material, in my judgment, has ever been introduced that is equal to iodoform. While ranking low as a germicide, it is almost or quite as important in the treatment of pulp-canals as the best germicides. My final treatment of pulp-canals is as follows: The canal is flushed with campho-phénique in which thymol has been dissolved in the proportion of 40 grains to the ounce. The gutta-percha point, fastened to the end of the root-plugger by heating the point of the instrument and pressing it gently to the large end of the cone, is dipped into the campho-phénique and then into iodoform powder, and is forced to place in the canal.

J. Leon Williams.

London, March 26, 1905.

THE QUESTION OF DEFINITE PERCENTAGE SOLUTIONS.

To the Editor of the Dental Cosmos:

Sir,—In the January issue of the Cosmos, at page 158, Dr. Julio Endelman refers to an item that appeared in a dental journal concerning aqueous percentage solutions. Please allow me to point out some features of this subject and also to show the practicability of the rule that Dr. Endelman condemns.

An essential point to keep in view is that the liquid preparations prescribed by the dentist or physician are generally for internal use and are therefore to be taken by measure. Hence we must distinguish between weight percentage solutions and weight-volume percentage solutions. For instance, the strength of all liquid chemicals such as the acids, alkalis, and iron preparations of the pharmacopeia are expressed in percentage by weight, and are not intended for internal use, but may be used in making preparations for internal use. However, in prescribing remedies the physician or dentist is concerned in having a certain volume—fluid-dram, minim, or cubic centimeter—to represent a certain dose, say of the salt in the solution. Therefore, in ordinary prescriptions the solid should be weighed and then a sufficient quantity of the vehicle, or solvent, used to make up the required volume. Hence, these percentage solutions are expressed usually in one grain or gram *for each per cent.* in each hundred minims or cubic centimeters respectively.

Thus, if one fluidounce of a 4 per cent. solution of cocain be required, the quantities are, by volume, $480 \times 0.04 = 19.2$ grains cocain. The rule therefore is: Multiply (for fluidounce preparation,) 480 by the per cent. desired, and the product will represent the number of grains to the fluidounce.

Again, Dr. Endelman would do well to reassure himself regarding his rule for definite percentage solutions by weight. Suppose we are to make a 20 per cent. cocain solution by his rule: then 20 per cent. of 456 is 91.20, making the total weight of the solution 547.20 grains. But the 91.20 grains of cocain is but a little more than 16 per cent. of the whole.

Even in the weight-volume method, we must know whether the substance to be dissolved will increase the volume of the finished product. For example, let there be required the amounts of cocain hydrochlorid and of water in making a fluidounce of a 20 per cent. solution—

remembering that every 100 grains of the salt will increase the volume 80 minims. Now, one grain will increase 0.8 minim, and 96 grains (which is 20 per cent. of 480) will increase 0.8 times 96, or 76.8 minims. Subtract this from 480 and we have 403.2 minims, or about 7 fluidrams, the amount of water to be used with the 96 grains of cocain.

The difficulties of this subject would be much less were we to adopt exclusively the metric weights and measures.

L. H. PHIPPS.

PAW PAW, MICH.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—Having been favored with the opportunity of perusing a communication by Dr. L. H. Phipps [see above] in criticism of the rule which I have formulated for the preparation of definite percentage solutions of solid substances in liquid vehicles, as published on page 158 of the January issue of the COSMOS, I desire to make the following reply:

It is not the practicability of the method, but the author's erroneous conception of the significance of a definite percentage solution by weight which I desired to point out, and if possible to correct. It matters not a particle to the compounder whether 4, $4\frac{1}{20}$, $4\frac{1}{10}$ or $4\frac{1}{5}$ grains are to be added to a given volume of liquid. The effort in either case is doubtless identical.

The question at issue is one of such simplicity that it seems difficult to conceive that a definite understanding should not have been reached ere this. In prescribing a solution of a given agent, the object in view is to bring about the physiological effects of a predetermined quantity of the base, and not of the vehicle. A solution prepared as per Mr. Phipps' rule cannot be a definite one. He bases his calculations upon heterogeneous standards, *i.e.* volume on the one hand and weight on the other.

A percentage solution implies that a given quantity of a drug by weight shall be dissolved in 100 parts of a liquid vehicle, or in other words that every hundred parts of water by weight shall be made to carry the desired percentage of the solid constituent, the volume of the resultant preparation being increased inversely to the density of the solid.

The example quoted by Mr. Phipps does not prove his point, but on the contrary illustrates the correctness of the rule which I am advocating, and which is the one generally accepted and put into practice by pharmacists. In this connection it will be of interest to read the opinion of Prof. Joseph P. Remington, the well-known pharmaceutical chemist, who in a communication to the writer expresses his views as follows:

"It is very desirable that the method of making percentage solutions should be uniform, and in my opinion there is but one correct method. A percentage solution is either a definite quantity in a given weight of a liquid, or a definite quantity in a given volume, and inasmuch as we use cubic centimeters, grams, grains, and fluidounces in this country, we should adopt one system and adhere to it. By far the greater number of percentage solutions are those which contain a certain percentage of a substance (usually a solid) in a definite volume. For instance, a physician prescribes one fluidounce of 4 per cent. cocain hydrochlorid solution. Now, a fluidounce weighs 455.7 grains, and 4 per cent. of this is 18.228 grains, the quantity of the agent to be used. There are only 455.7 grains in one fluidounce. Inasmuch as you must weigh the cocain, you should also use the weight of one fluidounce of water, and not the measure in minims of the fluidounce, because a minim of water and a grain are not synonomous terms."

The difficulties of the subject would be at once eradicated were we to accept a uniform interpretation of the idea conveyed by "percentage solutions."

JULIO ENDELMAN.

PHILADELPHIA, PA.

THE "MAASCH METHOD" OF ATTACHING CROWNS TO TEETH.

To the Editor of the Dental Cosmos:

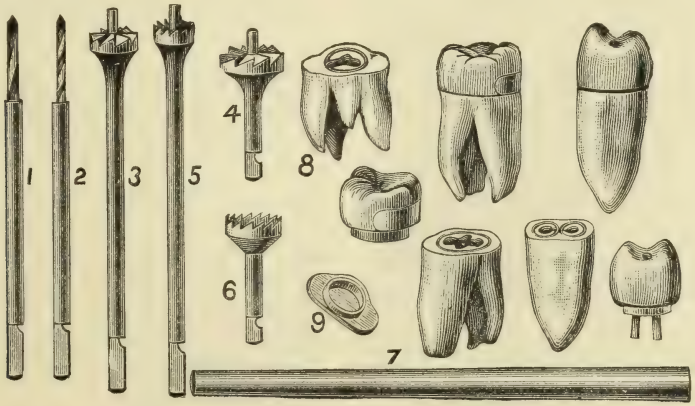
Sir,—In the current Cosmos (April 1905), page 451, Dr. L. E. Custer appears unaware of the fact that the Dental Cosmos of February 1889, page 134 ("Incidents of Office Practice"), credits Mr. H. F. Maasch, a student of the New York College of Dentistry, with the device described, while the following issue (March 1889) of the Cosmos, at page 233, quotes from *The Record—Students' Society, N. Y. C. D.,* the appended description and illustrations of Student Maasch's "Method of Attaching Crowns to Teeth":

Method of Attaching Crowns to Teeth.

After drilling out the nerve canal I cut the tooth down smooth, even with the gum, by the use of an instrument known to the profession for many years (Nos. 3 and 4). I then cut a groove around the pulp-canal with an instrument known as the circular saw (Nos. 5 and 6), made to size necessary, thus giving lodgment for a ring of metal. After this ring is made sufficiently low (about one-sixteenth of an inch) to correspond with the smooth surface of the root, I put a cover, soldered to ring, upon the crown surface of the root so as to cover it completely (No. 9).

If strength be required, a pivot can be easily applied to the cover in such a way as to project into the pulp-canal.

A tooth soldered to this cover will give as perfect results as have ever been obtained by any other method of crowning teeth. This crown will be found strong enough to carry any reasonable amount of bridge work.



Nos. 1 and 2, Canal drills. Nos. 3 and 4, Facers, for planing the tooth. Nos. 5 and 6, Circular saws for cutting the groove. No. 7, Metal rod for making ring. No. 8, Root with circular groove. No. 9, Ring, with cover attached.

I had recently recalled the "Maasch method," with a view to its special adaptation to the modern mode of face-plating root-ends in crown and bridge work to avoid the pericemental irritation of peripheral bands and caps. Dr. Custer's tapered ring may prove a retaining adjunct to the contemplated modification of the early and excellent "Maasch method."

W. Storer How, D.D.S.

Philadelphia, April 15, 1905.

PROCEEDINGS OF SOCIETIES.

FOURTH INTERNATIONAL DENTAL CONGRESS, ST. LOUIS, MO., AUGUST 29 TO SEPTEMBER 3, 1904.

(Continued from page 498.)

SECTION V: Oral Surgery.

Chairman—G. V. I. BROWN, Milwaukee, Wis.
Secretary—ARTHUR D. BLACK, Chicago, Ill.

THE CHAIRMAN. The next paper upon the program is a paper by Hofzahnarzt W. PFAFF of Dresden, Germany, "Stenosis of the Nasal Cavity Caused by Contraction of the Palate and Abnormal Position of the Teeth," which will be read in English by Dr. G. B. Maercklein of Milwaukee, Wis.

Dr. Maercklein read as follows:

STENOSIS OF THE NASAL CAVITY CAUSED BY CONTRACTION OF THE PALATE AND ABNORMAL POSITION OF THE TEETH: TREATMENT BY EXPANSION OF THE MAXILLA.

The present paper embraces a consideration of the latest researches of Zahnartz Gustav Schroeder of Cassel, Germany, involving the examination of over 2000 skulls, as well as 200 school children who were mentally deficient, 120 inmates of reformatories, and 1000 convicts.

In the year 1886 Dr. Eyesell delivered, at the Society of Natural Philosophy of Berlin, a lecture on "The Contraction of the Nasal Cavity Caused by the Contraction of the Palate and Abnormal Position of the Teeth." In the discussion which ensued, the possibility of treating the contraction of the nares through the expansion of the maxilla was considered doubtful, and all further experiments were dispensed with. In the year 1891 Prof. Sauer of Berlin tried to prove by two well-known cases that contraction of the nares could be remedied by means of rubber wedges of different sizes placed within the affected nasal cavity, thus straightening the crooked septum. It is not known how successful this treatment proved to be.

The anatomy of the nose and the bony structure of the skull is known, I believe, to everybody here, therefore I will at once begin with the subject of my paper —a cure for stenosis of the nares.

As the roof of the mouth forms the floor of the nasal cavity, it follows that a compression of the vault of the palate causes a contraction of the nasal cavity, thereby resulting in the approximation of the turbinated bones toward the septum of the nose.

The contractions may be: (1) Total, that is to say, when the nasal cavity and at the same time the hard palate are compressed on both sides from the anterior spine to the posterior spine, only touching the front or the back part of the nose. (2) Confined to one side (asymmetrical narrowing). In almost all cases the palatal contraction is accompanied by abnormal position of the teeth.

When inhaling through the nose, an olfactory sensation is the result. The current of air comes in contact with the olfactory nerve endings and mucous membrane of the turbinated bones. The course of the inhaled air is not along the floor of the nose, but directly along the anterior part of the nostril in a curved direction to the middle and upper tur-

binated bones, and then under the sphenoidal cells to the posterior extremity of the lower turbinated bones. In exhalation the course is exactly the reverse.

If the inspired air were to follow a direction along the floor of the nose and not come in contact with the olfactory nerves the sense of smell would be lost, even in the presence of the healthy olfactory apparatus. Furthermore, the nostrils warm, clean, and moisten the inhaled air. Nasal breathing is of the greatest importance to the circulation at the base of the skull. Every inhalation empties the ethmoidal veins, the longitudinal sinus, and the cavernous plexus. When the nose becomes closed, the work ceases and venous hyperemia of the meninges results. The consequences are manifested in different cerebral diseases. Should nasal breathing be interrupted or made impossible mouth-breathing results. Through insufficiency of moisture, drying of the nasal cavity is brought about. Infectious germs are inhaled directly into the throat. Inflammation of the mucous membrane, as well as severe infectious diseases, are the consequence. Through a defective sense of smell vitiated air is not perceived, and goes directly through the mouth into the lungs. Diseases of the larynx, trachea, and lungs are too frequently the outcome of such breathing to require more than passing reference. Through defective oxidation of the blood, anemia is brought about. Disturbed sleep and night cough are always concomitant with mouth-breathing. Bilious attacks, nervous disturbances, arrested mental development, and deafness are likewise symptoms of mouth-breathing.

With contraction of the nasal passages respiration is not normal. The accumulated secretion in the nose, caused by disintegration and irritation of the respiratory and digestive apparatus cannot be removed.

INVESTIGATIONS INTO THE ETIOLOGY.

At the present time careful investigations are being carried on concerning the cause of high palate with abnormal position of the teeth and contraction of the nares. In the year 1843 Robert of Paris gave as the cause hypertrophy of the tonsils. Gronbeck believes that mouth-breathing causes a weak development of the nasal septum, and consequently a high palate. Among other causes may be mentioned: rhachitis, hereditary high palate, tumors in the nasal cavity or impinging upon it, thumb-sucking and abnormal position of the teeth in the maxilla, supernumerary teeth in the maxilla and mandible, a high atmospheric pressure in the cavity of the mouth, insufficient pressure in the nasal cavity, cheek and lip pressure, the displacing of the temporo-maxillary articulation, and disorders of nutrition during the developmental period of the mandible.

The latest investigations in this field were made in Switzerland by Dr. Buser. He measured and studied the mouth and nasal passages of 514 adults with well-formed teeth. In opposition to the works and researches of E. Block, Koerner, etc., who hold that mouth-breathing is caused by adenoid growths and is a cause of high palates as well as of irregularities of the teeth and malformations of the jaws, Buser states that the leptoprosopic face shows a high and narrow palatal vault and a high, narrow nasal cavity. In this form, as the teeth of the second dentition find scarcely room for development, dental irregularities and V-shaped arches result. The chamaprosopic form of face is indicative of wide nostrils, in harmony with a wide palatal vault.

Difficult breathing causes hypertrophy of the tonsils and swelling of the mucous membrane. The narrow respiratory passages of the leptoprosope are often displaced, while the same condition exercises no influence in the presence of normal nasal breathing as exhibited in the chamaprosope.

Therefore we find mouth-breathing as a consequence of adenoid vegetation in the leptoprosope oftener than in the chamaprosope. The anatomical conditions present in such cases contradict the possibility of any influence of the relaxed muscles of the cheek on the max-

illa or on the shape of the face, by inspiration through the mouth.

The examinations and researches of Schroeder began five years ago and, as yet unfinished, embrace the examinations of 200 school children mentally deficient, 120 inmates of reformatories, over 1000 convicts, and 2000 skulls of the museums of Berlin, Vienna and Frankfurt. His investigations and results will be published in the near future in a separate communication, properly illustrated.

In most cases of irregularities of the deciduous teeth, as well as of the permanent ones, a deviation of the nasal septum is to be expected. The greater the pressure of the septum against the turbinated bones the less air will be inhaled through the nasal passages at each inspiration. The narrowness of the nasal passages produced by polypi, abscesses, and growths in the nose will not be discussed in this paper; such diseases are within the field of the rhinologist.

In most cases the curvature of the nasal septum is in a direction opposite to the pressure. At the same time, on the side on which there is a narrowing of the nares a more or less strongly pronounced deafness exists, almost always detectable in persons with irregularities of the teeth, an observation which is in some respects of great importance.

Concerning concomitant disturbances in the eyes, I must refer my readers to the work of Dr. Danziger.

MODES OF TREATMENT.

To remedy a contraction of the nasal passages an operation is required for the removal of part of the turbinated bones or part of the septum. Now, if it is possible by expanding the maxilla to remove the pressure against the septum and at the same time to enlarge the base of the nares and depress the high palate, there is a probability that the septum may eventually become straight. The volume of inhaled air will be larger, the turbinated bones will recede from the septum, the circulation at the roof and base of the skull will improve by the regular nasal inspirations, the mental activity as well as the sense of smell will be restored.

The first experiments on the expansion of the jaw for the purpose of expanding the nares were made by Schroeder five years ago, after the expansion of the nares by Prof. Sauer by means of india-rubber wedges had not met with any appreciable success. The Coffin plate is absolutely to be rejected, although it is not altogether impossible to get some results from it. The only successful treatment consists in capping the teeth with bands (Heydenhaus) and to use a screw which can be put on or taken off as desired (Schroeder's system).

Schroeder speaks of two different orthopedic treatments: (1) In an existing contraction of the nares, slowly expand the maxilla until the breathing through the nose becomes normal. (2) As a result of stenosis of the nasal passages prognathism of the mandible results, in which case the maxilla is forced back to a point near the vertebra. The contraction of the nares is too great to allow the passage of an increased volume of air, especially in sudden exertions of the body, and results in diseases of the respiratory organs. In these cases the maxilla must be brought forward at the time of the first dentition and expanded until the articulation becomes normal. The cure will then be quite certain.

The expansion of the maxilla in connection with the regulation of teeth is not a new procedure. In 1895 Dr. Goddard of San Francisco published a case in which the symphysis had expanded one-half inch in three weeks. Such rapid expansion in the treatment of contraction of the nares would not be favorable to success; on the contrary, it would offer many serious disadvantages. The expansion of the upper jaw as a cure for contraction of the nares differs essentially from expansion for the regulation of teeth in abnormal position. It is necessary to be familiar with the anatomy of the part as well as with the diseases of the nose and palate before undertaking such treatment. It is important for the operator to understand fully the regulation of teeth. The apparatus for

expansion is firmly fixed with cement and worn by the patient with no inconvenience whatever.

The expansion must take place slowly, according to Schroeder's system. The slower the expansion the more perfect will be the widening at the higher part of the vault, that is, at the base of the skull, a result which, according to Schroeder's opinion, is of the greatest importance. An expansion too quickly effected would, in all probability, cause a separation of the halves of the maxilla, as Dr. Goddard has described. The success of the treatment would be very questionable, for it may easily happen that after a rapid expansion the current of air entering the floor of the nose will not reach the upper turbinated bones. It is important to turn the expansion screw only far enough for the little patient to distinctly feel the pressure. After two or three days every uncomfortable feeling will disappear, and the treatment is continued in the same way.

Schroeder speaks of a little patient who had undergone two operations for the removal of adenoids in the posterior nares. These operations were performed without any favorable effect. Strange to say, the pressure of the apparatus was not felt on the palate or alveolar surfaces, but rather on the forehead near the root of the nose.

In four weeks' time this great contraction of the nares had been sufficiently remedied to allow breathing through the nostrils; and the sense of smell, which had been entirely lost, was restored.

Schroeder has devised for this purpose an apparatus with an interchangeable screw, operating upon one or both sides. It is to be placed in a little interchangeable sleeve fastened on the apparatus. Formerly the first small screw, firmly fastened to the apparatus, was after a short time unscrewed, taken out of the mouth and no longer used. Then a new apparatus provided with a longer screw was made and adjusted with cement.

Everyone who has had extensive experience in the regulation of teeth knows how tedious and harmful such a treatment would be. Now with Schroeder's sleeve screws the apparatus fastened in with cement will not be taken out of its position, but the screw will be screwed back to its first place, whereupon it is removed and the next size screw properly adjusted.

The time of treatment depends naturally on the case itself. The treatment of the contraction of the nares may last from three to twelve months. Naturally more time is required in those cases where deafness is present. The question is, Is deafness with abnormal compression of the jaws to be considered the result of compression of the Eustachian tubes, or is it caused by swellings or inflamed tissues? Schroeder thinks that by expanding the jaw the existing compression on the auditory tubes is removed, and the exterior current of air will have its natural effect on the ear. Further observations will be necessary to answer this important question.

It should be noted that the position of the tension screw must be changed according to the type of contraction under treatment. An accurate knowledge of the condition, which may be furnished by a rhinologist, is absolutely necessary.

CONCLUSION.

I am entirely in sympathy with my colleague Schroeder's views. I have performed a great number of expansions of the maxilla in treating cases of prognathism, and always succeeded in effecting nose breathing where it was impossible before. It is wonderful how rapidly the physical and mental development of such children progress after the operation.

The statement that children become nervous while under treatment cannot be substantiated. It is only a question of a few days of discomfort for the children. I always found that with the expansion of the maxilla there was a flattening or lowering of the palate, and even when the expansion was not very great it was sufficient to restore normal breathing.

Dr. T. W. Brophy, Chicago, Ill., then

read a paper entitled "The Radical Cure of Congenital Cleft Palate," as follows:

The Radical Cure of Congenital Cleft Palate: with Exhibition of Patients.

I desire to call your attention to a few cases, which I will briefly describe, and to exhibit a few of the patients upon whom I have operated for immediate closure of the hard palate in early infancy.

I am well aware that the methods which I pursue are not generally practiced and are not well understood. I hold it to be highly important that the operation upon the palate should be made before that upon the lip. It is a great mistake to commence at the oral opening and to partly close the only aperture through which a subsequent palate operation must be made. The surgeon needs all the space that can be secured, which is none too much in a young child. The lip operation is comparatively simple and trivial, and it can be performed at any time; but the palate operation is made much more difficult if the lip has been closed prior to the operation. In proof of this I bring before you several patients whose condition will, I think, convince you that my position and practice are correct.

The first patient I show you is one upon whom I operated when she was ten days old. In this case we had double hare-lip and a wide cleft of both hard and soft palate. The palate was closed at one operation throughout its entire length. The tissues had assumed normal relation and form. The arch is sufficiently wide to serve every purpose and the occlusion of the teeth is fairly good. You will notice that the occlusion of the upper with the lower teeth is not quite normal, but by employing means well known to dental practice these teeth can be forced a little farther out, so as to properly occlude with the lower ones. The fissures of the lip extend into the nostrils. The intermaxillary bones and the center portion of the lip were rudimentary. The lip, therefore, was formed by utilizing the tissue lateral to the fissures. An improvement in its appearance is yet to be made by removing some of the integument and reflecting the mucous membrane upward, thus shortening the lip. This child is now thirteen years old.

The second patient I show you is a child six years old. I operated, closing the hard palate, when the child was six weeks old. I have here a cast of the parts as they were prior to the operation which I will pass around. It was by no means an ordinary case. The opening is unusually wide, with the amount of tissue present comparatively small. On examination of the patient you will see the palate is completely closed, the parts being in good apposition through the reduction of the arch. The opening through the lip gave good access to the parts and the operation of moving the parts together was for this reason performed with greater ease. This little child is a brother of the girl first exhibited.

It is interesting to note in this connection that of the children born to the parents of these two, four were deformed in this particular. The eldest one was normal, and no evidence of the deformity existed, even to the slightest degree. The second was afflicted with double hare-lip and cleft palate; the third with hare-lip; the fourth with double hare-lip and cleft palate; the fifth was normal; the sixth was afflicted with single hare-lip and cleft palate. The deformities in these children have confirmed my opinion that nearly all such cases have hereditary origin. In this instance the paternal grandfather and a brother of the mother were similarly afflicted.

In conclusion, I wish to say that the time is not far off when the teachings will be so changed as to advocate the early operation for the cure of cleft palate.

In my paper read at Paris in 1900 I made the statement, which was then correct, that I had not lost any infants following the operation of cleft palate, and yet when I returned home the second patient I operated on I lost. There are many factors entering into this opera-

tion, and anyone who has had experience realizes that one of the most important considerations in the management of these cases is to have the infants under your immediate care and supervision for a time before the operation is made. The food question following an operation is the most important one—as to what kind of food best agrees with the individual, the kind that will nourish the child, how much food to give it, and so on; you must in all cases adapt the food to the particular infant. Surgical shock always raises the temperature somewhat, at times up to 102 or 103 degrees, and I resort to bathing with alcohol and water, using the methods adapted to the case.

I have not attempted to explain in detail the cases exhibited; that is not part of my duty here today. I am here to see whether I can interest anyone to advise parents to adopt this method and to advise physicians to throw aside old-fashioned notions and the teachings of their masters, and accept the views of today.

Discussion.

Dr. José J. Rojo, City of Mexico, Mexico. I wish to ask Dr. Brophy to what cause he mostly attributes cleft palate, and whether heredity may be considered a factor in its etiology.

Dr. Brophy. The influence of heredity is applicable to this as well as to any other malformation. We know, for instance, that sometimes club-feet are transmitted. I had a patient a few years ago who had in addition to cleft palate, double hare-lip, protruding intermaxillary bones, umbilical hernia, curvature of the spine, two thumbs on each hand, six toes on each foot, and a number of other deformities too numerous to mention. Malnutrition may be a cause —and I am satisfied that it is. I will cite the case of a woman who during the second month of gestation suffering from appendicitis, was operated upon, with the result that life was nearly lost from the operation and the infection in the appendix. When the little one came it had a hare-lip and a cleft palate, and I am satisfied that it had resulted from malnutrition—a lack of the essentials to build up the forming child. I believe that most parents who are of the opinion that pre-natal impressions play an important part in the causation of these deformities are in error; because, if one examine any considerable number of these cases, it will be found that the supposed pre-natal impression is often received at such a late period in the fetal life that it could not cause any such deformity. I always ask the mothers if they know how to account for the deformity, and almost all of them say that at a certain time they sustained a very great shock or fright; but when one comes to ascertain at what period of gestation that shock or fright occurred, it will be found that it occurred at the seventh or eighth month. Now, we all know it is impossible for a fright or shock at that time to produce a deformity such as cleft palate or hare-lip. If shock or fright could produce such a deformity, it must occur in the formative stage of the development of the fetus, and while the tissues are yet ununited. The union of those parts occurs prior to the fifth month; after this period only a little suture which outlines the union of the premaxillary bones with the maxillary bones proper can be seen. This sets aside the argument often made that pre-natal impressions cause cleft palate. If pre-natal impressions are capable of producing these deformities, the impressions must occur prior to the fourth month.

The Chairman. I would like to speak, if possible, on both sides of the question, and I think I can make it very clear that there is yet much to be done in the matter of early operations before we can successfully prevent arrested development and have anything like equal development of the features afterward when palate fissures have been closed, as described, in early infancy. I shall also undertake to show the danger of the lip operation at too early an age, and illustrate the wisdom of deferring these operations until an age when they can be done with some degree of deliberation, thus saving the unsightly scars that so commonly result. I have a few slides

which will give you the idea. Dr. Brophy, having performed the operation for so long and so often, unquestionably gets results which no one else could get. He always speaks of it as if it were simply a matter of choice with the surgeon, as if anybody could do it if he chose, and I think a great deal of harm may result by reason of that, which would not occur in Dr. Brophy's hands, because less experienced persons will be led to attempt to do the work.

Dr. VIDA A. LATHAM, Chicago, Ill. I would like to ask Dr. Brophy and Dr. Brown the indications for early operations and the contra-indications.

Dr. BROPHY. If I could control the patients, I would operate always before the third month. A little girl, now about fourteen years of age, was here. I operated on her, as I remember, before she was ten days old. I think there is no objection to operating at that very early age provided everything is going well. I want to know that all the organs of the body are performing their functions normally. I want to keep the child under observation a week or two, that I may study its peculiarities; and I want to have the patient well prepared for that operation—I regard this as one of the most essential steps; then, at the age of three months or under, the operation should be made.

The question has been asked why the operation should be deferred later, until the subjects become stronger. It is a very well established fact that the nervous system of a young infant is not developed up to a point which would enable it to sustain the same shock that it would when a year old. I do not think there is any doubt about that, because all the modern physiologists have so asserted, and this view is in accord with my own experience. I think that answers the question. If the condition was such that it was necessary to go beyond the period of six months, then I would not transfix the bones, although I have done it as late as the eighth month. It seems to me that every week past the period of four months makes the danger greater of transfixing the bones, and the only cases I have had serious difficulty with have been those in which I attempted to operate on infants of over six months. Then the shock is always greater. The bones are more difficult to move, and in very young infants we find that almost half the bone constituent is organic matter and we can bring them together with greater ease.

Dr. EMMA EAMES CHASE, St. Louis, Mo. How do you feed them?

Dr. BROPHY. I have succeeded in getting the head nurse in the children's ward at the Presbyterian Hospital, where I do the greater part of my work, to write an article on the care and food of my patients, and that will soon appear. I look forward to the publication of that article with a great deal of interest. She knows more about the care of my patients than I do. The food is adapted to the wants of the child. We have what we call modified sterilized foods—all the different kinds of food we have in the hospital, and to answer the question it would be necessary to go over them all. I must state that the feeding of the infant is an art and a science that no surgeon can understand as well as the nurse of the child. I have a very profound admiration for those nurses. We could not live without them; they are the noblest women in the world, and when we all go to the hereafter, we will find them there sitting in high places.

Dr. VIDA A. LATHAM. What do you do if you have no nurses? There is danger after the operation that the patient may die from want of nourishment.

Dr. BROPHY. Dropping the food into the mouth is a method we use a great deal, dropping into it a little at a time, and feeding carefully in that way.

THE CHAIRMAN. These children, when they come to us, are at best degenerates. We have no certainty that they are complete in other respects and that they have not other deformities which do not show as do the palatal deformities but which may be of greater vital importance, involving some of the internal organs, and particularly the digestive tract. Therefore I like to have

the infants under my control and observation for a while before I do very much in the way of surgical operative work upon them. In regard to the feeding, we find it varies very greatly and must be adjusted to the individual baby with great care and consideration. Where I can have the child under control, I prefer to put off the operation until such time as I am reasonably sure that the child is at its very best, and that can only be determined to a certainty by carefully observing the peculiarities of each child. The death rate of all operations upon infants is unquestionably high. Dr. Brophy has done so many operations and so often that he does them with much less shock to the child than other surgeons would. But I do not believe that infants stand an operation very well. The shock of the operation is great because the nervous system and digestive tract are not well developed. We know that infants are frequently unable to withstand the uncertainties of a new life and new environment after birth even without operation. The history of those conditions is that such children do not stand hemorrhage well. Of course in doing the work skilfully, as Dr. Brophy does it, there would be very much less hemorrhage than if done by other hands. The point I make in this discussion is that it is not the work for everybody to undertake, and moreover I believe good results can be accomplished without the dangers of operation in early infancy.

Dr. Brophy (closing the discussion). Two things occurred to me just now while Dr. Brown was speaking: one was the apathy which is manifested everywhere in the world in regard to palatal work. As an illustration of that statement I want to say there is a member from a foreign country in this congress who traveled over Europe and all over the Eastern states of this country to get an operation performed on his little boy, and all refused to operate. He happened to hear of me, and came to Chicago. In twelve days after he arrived there he was on his way home with the cleft in his boy's palate closed. So, you see, they will not do it; surgeons will put it off; they defer it for some cause. Probably because operations are difficult and often fail of success. We do not have cutting out of sutures any more. We have a way to avoid that. The question of hemorrhage is a very serious one; and in the discussion of the paper that I presented in Paris in 1900 a most accomplished surgeon, a surgeon who is probably doing more surgery of the palate today in France than anyone else, Professor Sebilot, made the statement that the reason my patients did not die was because there was no hemorrhage. It is true there is no hemorrhage of any consequence, and why? Because we make no incisions in an operation on an infant—rarely make them; we do not even freshen a particle of the surface of the tissue at the early stages of the operation. We move the bones together—that is the first step; and the second step is to pass the needle. So all the hemorrhage that we get is that produced by the passage of the needle. Consequently the child does not sustain a loss of blood. After the sutures are all in position, and after the parts are about ready to come in contact, it is then that we freshen the edges; and so soon as we have them freshened we bring the parts together and we get immediate cessation of the slight capillary hemorrhage. If there should be a little flow of blood by the passage of the needles, a gauze wrung out of hot water—as hot as can be borne without excoriating the parts—is placed in contact with it and there is no more flow of blood. The question of hemorrhage has been reduced to a minimum, and so little hemorrhage do we have that we may say that practically we have no hemorrhage. We divide no vessels, and all the blood we get is that from the capillaries, an insignificant amount.

Dr. Brown complimented me just now by saying that the great number of cases I have had enable me to do this well and without shock; and when I speak of that it brings us back to the question of hemorrhage and the method of procedure the condition of the patient before the operation and the care of the patient afterward. When we take

all those conditions into consideration, as well as the technique of the procedure, which should be reduced to the simplest possible steps, then we can do the operation without much shock. I do not consider the closure of the hard palate of a child now very difficult; there is a great deal of detail about it, and I am surprised sometimes at some of the statements of my friends. I write to them, and send out pictures, and tell them everything I can think of bearing on the question, yet I find that some of them have sutured through the bones but did not pass the sutures above the horizontal plates of the palate.

Last year, while attending the Fourteenth International Medical Congress, in Madrid, Spain, I was invited by that most accomplished surgeon and professor, Dr. Kirmisson, who is at the head of the Trousseau Hospital of Paris, France, to operate in his hospital. He told me he would have the patient ready on my arrival in Paris. When I arrived at the hospital they had several patients, and I operated on one. I was honored with the presence of thirty-four of the most distinguished surgeons of Paris, to witness my operation. Professor Ehrman, whose name appears in the literature on this subject of hare-lip and cleft palate from his very early experience as a physician and surgeon, was one of my audience. I feel very much encouraged in this work, while I have met with doubts and criticisms. One prominent man would say, "You are going to close up the nose and that would be worse than the cleft in the palate." Another would say, "It will never do to close up the palate of the child," and so on. But now fifteen years have passed and the work is increasing, and the eminent men throughout our own and foreign countries have been kind enough to me to take up this work and advocate it among their colleagues.

The Chairman. If there is no other business to come before the section, we will adjourn. Personally I feel very proud that we have an American who is being copied by people abroad. I feel proud that the people from abroad have been so courteous as to give so much attention to this section, and say such nice things to us; and I am very thankful to all of you. I trust that when these proceedings are published you will feel that your faithfulness has been fully rewarded. We have now completed our program, and if there are no other remarks upon this subject we will adjourn. The section of Oral Surgery is now adjourned *sine die*.

SECTION VI: Orthodontia.

Chairman, Dr. Edward H. Angle, St. Louis, Mo.
Secretary, Dr. Milton T. Watson, Detroit, Mich.

First Day—Monday, August 29.

The section was called to order at 2.40 P.M. by the chairman, Dr. Edward H. Angle.

The first order of business was the reading of the Chairman's address by Dr. Edward H. Angle, as follows:

Chairman's Address.

In behalf of the science of orthodontia it is with much pleasure that I welcome you to the meetings of this section, and venture the fond hope that it may be replete with pleasant and profitable experiences, both social and scientific.

The great importance that orthodontia is rapidly assuming proves the wisdom of this congress in assigning to us a distinct section for this special and important branch of science. Well may we be proud of the rapid strides that orthodontia is making. Well may we be proud that we have such a grand opportunity to meet and work together for the upbuilding of a branch of science so ex-

tremely fascinating—a science with a future so full of promise for contributing to the health, beauty, and happiness of the human race. I believe we can with real truth proudly assert that no other branch of dental science is at the present time making such rapid progress.

As there are many papers to be presented at this meeting, time will not permit me to review the past history of orthodontia, but it cannot be amiss for me to venture some suggestions for its future.

It has long been my belief, as many of you know, that orthodontia is by right, and with boundary lines clearly defined, a science which should be taught and practiced as a specialty; and to this end I have given and shall continue to give my best energies.

It is a fact which must be admitted by most thoughtful men, that the requirements in the study and preparation for the practice of orthodontia are so exacting that it is not probable that anything like its best possibilities can ever be realized with our present methods of education, or by combining its practice with the general practice of dentistry.

It is true that the marvelous improvements in the treatment of cases of orthodontia in the past few years render certain operations far more easily accomplished than formerly, and yet the standard in requirements of treatment is now so much greater that the difficulties in attaining the ideal in treatment are correspondingly increased. Most of the work done a few years ago, and considered creditable then, seems now, when analyzed according to the standards of the new school of orthodontia, to be ridiculously crude and unscientific. So the statement made many years ago by Dr. Guilford still holds true, and, we believe, must always hold true—that "no matter to what degree of perfection the regulating appliances may be brought, the complications and great variety of cases will always make orthodontia the most difficult class of work that dentists are called upon to perform, and will necessitate a degree of skill and judgment to meet these requirements that few have the patience or ability to acquire."

So, it must be apparent to all thinking men that its greatest possibilities can only be realized along the lines of specialization, for since it came to be practiced by men who give their entire time and attention to it its attainments have been greater than in its entire previous history.

It is practically only since the last great International Dental Congress held in America that men began to adopt orthodontia as an exclusive specialty. Now their numbers are rapidly increasing, and in every instance that I know of their efforts are meeting with most gratifying results, and I cannot help venturing the prophecy, that by the time of the meeting of another International Dental Congress in America, orthodontia will be represented by competent, conscientious specialists in every prominent city in the world. I sometimes marvel that the great cities of Europe, where wealth, culture, refinement, and appreciation of the best are so great, still remain without specialists in orthodontia.

The specialization of orthodontia is but the natural unfolding of progress and knowledge, and is but the following of the same general law that led to the establishment of other well-known specialties in medicine. Yet it is a singular fact that the specialties of rhinology, ophthalmology, etc., were established in spite of keen opposition on the part of the general practitioners of medicine—the very persons, it would seem, who should have been first to encourage a closer study by those having aptitude and liking for these special branches. I do not consider that the specialization of orthodontia is meeting as strong opposition from the general practitioners of dentistry, yet I regret that there is opposition, and that, too, from those who it would seem should act with greater wisdom.

The specialization of orthodontia will in no wise debar the general practitioner from its practice any more than the general practitioner of medicine is debarred

from the practice of diseases now truly belonging to the field of the specialist. But it remains an axiom, that whether practiced by the specialist or by the general practitioner, the success will be in proportion to the knowledge and skill of the man. And I would repeat, that the specialization of orthodontia is but the natural—the inevitable, the irresistible.

In accordance with this belief, four years ago there was organized in this city for the advancement of the specialty and the specialization of orthodontia, the American Society of Orthodontists, with ten members. At the second annual meeting the number of members reached twenty-seven, and at the third, or last, meeting the membership was increased to fifty-two, or an increase of over four hundred per cent. in the three years, and the good work that this society is doing on behalf of orthodontia I believe is felt throughout the world. As an evidence of this good work it is with much pride we invite you to examine the handsome collection of casts contributed by some of the members of this society, which are on exhibition in the next room. Among its members are representatives from Canada, New Zealand, England, Ireland, Austria, Sweden, Holland, and Mexico. All teachers and specialists of orthodontia are eligible to membership and are cordially invited to become coworkers with us.

It seems to me that this time should be especially important for the interchange of thought from men from different parts of the world, for the reason that there is still such wide variance of opinion on the subject of orthodontia, as all who keep in touch with the literature of the day are aware. There are doubtless some questions in orthodontia on which a uniformity of opinion is hardly to be expected. Men have always differed as to methods employed for accomplishing results, or, in other words, as to the "how"—the technique. Doubtless this is desirable. Were it not so, there would probably be no progress. But as to what shall be the diagnosis, what the aim in treatment, what the results when completed, are questions on which it would seem to me men ought to have uniform opinions. Thus, as to what it is most desirable to accomplish in each given case, both in the final positions of the teeth and in the art relations of the face, I believe that we can and should agree, at least in a very large percentage of the cases we are called upon to treat. There cannot be a half dozen different opinions as to what is required in a given case, and all be right. There can be but one correct opinion.

I believe that mutilation and the sacrifice of teeth is either necessary or unnecessary—is either right or wrong. If mutilation, as claimed by many, is essential to the best results in occlusion and usefulness of the teeth, as well as for establishing the greatest beauty of the face, then there must be laws governing this that can be well defined and clearly comprehended, and every practitioner should know them and be able to apply them. On the other hand, if mutilation is unnecessary in the establishment of the best results in occlusion and art, then there must also be laws that govern this, also clearly definable, and all should know them that they may work intelligently toward the best application of these laws. There must be classified knowledge governing these points, for if there are no definable principles, then orthodontia is not a science—is not a profession, but is still in chaos and empiricism.

I believe these questions are of such vital importance in the great work which we are called upon to do as orthodontists, now and in the future, that it behooves us to settle them as rapidly as possible, always bearing in mind that science, which is only another name for truth, is for all and comes from all.

It affords me great pleasure to present to you the symposium of papers which are to be read before this section, and which, we trust, will represent the brightest and best of orthodontia today.

We are especially favored by having papers from honored contributors from across the seas. We feel highly gratified that we are to have papers from such

well known and distinguished men of science as Dr. Schroeder of Greifswald, Germany; Dr. Pfaff of Dresden; Dr. Franz Zeliska of Vienna; Dr. John Grevers of Amsterdam, Holland; Dr. Francisque Martin of Lyons, France, and Dr. Rojo of Mexico City; also from our American friends, both in this country and abroad, who are so well known to us as to need no introduction here.

It is with great pleasure I welcome you all, and I urge upon you all to work most earnestly and sincerely to make this great meeting a milestone in the history of orthodontia.

The Chairman then called on Dr. CHAS. A. HAWLEY, Columbus, O., to read his paper entitled "Determination of the Normal Arch, and its Application to Orthodontia." [Printed in full at page 541 of this issue of the COSMOS.]

Discussion.

DR. N. S. HOFF, Ann Arbor, Mich. The subject of the paper is largely a mathematical proposition—a geometrical problem at least, which as we know admits of little or no discussion. The chairman suggested in his paper that we should reduce orthodontia to definite principles, but I don't know whether we can reduce it to mathematical principles or not. Biology is not a mathematical science, and the science of orthodontia comes under the heading of biology rather than chemistry or mathematics. It is not one of the exact sciences and it seems to me it would be very unwise and undesirable to reduce the work of orthodontia to mathematical formulæ, because if we do that we put ourselves more or less under obligations to mathematical rules which are arbitrary and restricting. I think this application of the principle which Dr. Bonwill has worked out for us is a very happy thought, and I have no doubt it will prove to be very useful as a standard—not an exact mathematical standard, such as the presentation would lead us to believe possible for every case. We cannot measure the human countenance in fractions of inches, and no more can we measure the exact positions of teeth in the mouth. No two persons or individuals are made up mathematically upon the same lines. No two persons are of the same type, or size, or features, so we cannot apply definite mathematical formulæ to this work. I fear that if we undertake to make our work conform to mathematical formulæ we shall produce results that will be wholly inartistic. Those of you who have tried to fit this formula which Dr. Bonwill first laid down for use in prosthesis will recall the many failures you have met in adjusting artificial teeth on these lines, and fitting them in the mouth only to find inharmonious results. I think that if we follow that principle strictly in orthodontia we shall meet with the same unfortunate results.

I believe that the art feature of our work is equal to, or I might say more important than the mathematical or exact feature. It will not do for us to adopt so exact a formula and work too closely to it. That which leads to general harmony is of much greater importance. It is good to have a standard, but we should use it with intelligent discretion. The idea is a most happy one when properly used, and I thank the essayist for presenting it.

Dr. M. T. WATSON, Detroit, Mich. Some weeks after Dr. Hawley had been invited to read this paper before the congress he came to Detroit, and we spent an entire day making comparisons of some of my finished cases with the results obtained by drawings made according to this formula, and to our great delight found that the cases where I had obtained the best results, both esthetic and otherwise, were those most nearly conforming to the measured diagrams.

Dr. Hoff has brought up the point of the inartistic results that are sometimes attained when one confines himself to the Bonwill law in the making of artificial dentures. In orthodontia we have not this difficulty, because we have teeth the size that nature meant them to be. In prosthetic work we have the size of teeth that man selects, and man's judgment is often in error; so I can very readily see how inartistic results might follow. I do not believe that

Dr. Hawley himself thinks that every man should make drawings of each case he treats, but I can see where it will be of the greatest value to beginners, those who have not had sufficient experience to tell at a glance whether the arch is the proper width or not. I meet many cases where it is a problem whether the arch is of the right width, and certainly with this very exact formula to work by many of these difficult questions will no longer trouble us; they can be settled mathematically.

Dr. F. A. Gough, Brooklyn, N. Y. In relation to the objections made to Dr. Bonwill's law, in this case the essayist has given us a rule and we figure out a different proposition for each different case; it is much more exact than Bonwill's law.

Dr. G. D. Sitherwood, Bloomington, Ill. We have the lines of the face and of the human body both measured out, and while I do not agree that we could make a mathematical line as a standard alone, for of course the artistic comes into play all the while, yet it is certainly a valuable paper. It gives a standard of measurement of width and of lines by which we can take measurements of the sizes of the jaws and teeth, and some of the lines are good measurements to go by as a standard. Yet at the same time, every man who practices orthodontia has to bring in the artistic element, as Dr. Hoff has well said, but taking Dr. Hawley's formula as a foundation we can then bring in the artistic and use our own judgment as to the lines of beauty and measurement of what should be the perfect end in view in regulating teeth in the human arch.

The Chairman. I would feel guilty if I did not say that I appreciate very highly this paper—not that I think it is conclusive, by any means, but I think it is a true step in the direction of real science, which, you know, is only classified knowledge, and this is classifying knowledge.

There is far too much guess-work in orthodontia. You know it has practically all been guess-work as to art, diagnosis, and treatment until very recently. Now we have well-defined principles to guide us on all these points. We can eliminate most of the guessing, and this paper is directly in the line of the elimination of guessing and looking toward system and accuracy, and while none of us can place the proper value on it without first having much experience with it, yet orthodontists know enough about the principles of occlusion and Bonwill's law to know that it may be of great value in determining the form and position of the line of occlusion.

I do not think it probable that we will ever adhere strictly, rigidly, mathematically to this rule, as Dr. Hoff has said, for the reason that the halves of the arches, and for that matter the halves of our anatomy throughout, are never exactly alike. So to attempt the rigid, accurate adherence to fixed rules would be to violate the requirements of art and of anatomy; but these are minor points when applied to the principle under discussion. If it can furnish a good, intelligent rule on which to base our judgment as to the correct positions of the teeth, and I think it can, it will prove of much value, especially to the beginner in orthodontia.

Dr. Hawley (closing the discussion). A number of questions have been raised in this discussion that are questions in my own mind as well as yours. The time I have been working along this line has been too short to decide them. I am inclined to believe that in highly civilized persons—the people we work with in orthodontia—this form of arch will produce in every case the most artistic development of the face. I would like to find that nature has made few mistakes, that she has given to every person a form and size of teeth which if placed in a normal arch will best develop the harmony and beauty of the face. The indication of all the facts I have been able to collect in the time I have been working on this matter seem to point that way. The teeth in their shape and contact points seem designed to fill this form of arch and we know that they are better preserved through life when the arch and consequently the contact points are

perfect, and retention is easier too, for the arch is more nearly self-supporting. There are many things to be developed; for instance, I believe that we will find some relation between the sizes of the teeth, so that in cases where only part of the teeth are erupted we can find the size of the arch from one or two teeth alone. Of course there will be exceptions and abnormal cases, but they do not affect the general rule. And the form of the arch in the lower races may be different, but we do not regulate teeth for them.

In working from this plan the measurements must be accurately taken and the drawing carefully done. Any careless work is useless.

The CHAIRMAN. One of our German friends, Dr. FRANZ ZELISKA of Vienna, Austria, although not able to be present with us today, has favored us with an excellent paper. It is entitled "The Influence of Atmospheric Pressure upon the Molding of the Dental Arch." As Dr. Richard Summa of this city has made a study of this paper, I will ask him to read it.

Before reading the paper Dr. Summa stated that it was written in German and that his reading of it would be a translation. It was as follows:

THE INFLUENCE OF ATMOSPHERIC PRESSURE UPON THE MOLDING OF THE DENTAL ARCH.

We frequently meet in dental literature, especially in treatises upon orthodontia, the expressions cheek pressure and lip pressure, without any attempt on the part of the authors to define their individual conception of these terms, and they hint but obscurely that they imply muscular tension and the weight of the soft tissues.

My highly esteemed teacher, Prof. Partsch of Breslau, has given an explanation of these terms which appears to me to be the only correct one, and it will be my endeavor in this paper to acquaint the orthodontists with his idea concerning this matter.

The active force manifesting itself as cheek and lip pressure is, according to Partsch, nothing but atmospheric pressure. The degree of this type of pressure being but slight, its influence upon the position of the teeth is due to its constancy, and its significance becomes apparent only when it is absent on account of pathologic conditions.

At the outset it must be clear that atmospheric pressure, as such, is ineffective, but that it exerts its influence indirectly because of the existing difference of pressure within and without the mouth. That such a difference exists is known to us.

The oral cavity presents in normal condition, when the mandible is at rest, a chamber devoid of air or at least one containing but a small amount. For a better understanding I will quote the physiological investigations of Metzger and Donders. Metzger arrives at the following conclusions:

"By means of the muscles inserted in it, the mandible is held in a state of equilibrium in such manner that by the contraction of certain groups of muscles the various movements are brought about. However, an absolute equilibrium is not produced by the muscular tension alone. Rational reasons as well as experiences readily gained by simple experiments will eliminate the teaching that the mandible is held suspended by the muscles of mastication. While one can keep the mouth closed for hours without experiencing the slightest inconvenience, and certainly not be aware of the tension of the temporal muscles which are being strained by constant pulling, we readily become conscious of this fact if one tries to breathe but for five minutes with a minimum parting of the lips and a complete and even relaxation of the muscles, the mandible at the same time exerting a slight tension upon the above-mentioned muscles. The sensation of stretching the temporal muscle is greatly increased if we add only slightly to the natural weight of the mandible.

"Though the desire be strong to retain these muscles in a state of relaxation, fatigue will be experienced and an involuntary contraction of the stretched muscles will take place.

"We may observe another occurrence

whenever the mandible is separated from the maxilla while the mouth is closed. We will feel the mucous membrane on both sides drawn in folds between the arches, and at the same time a discharge of saliva into the mouth takes place. If the dental arches are separated still farther the lips will part with a noise plainly audible and the folds of mucous membrane will straighten out. In the meantime, respiration can be carried on constantly through the nose without causing any change in these conditions. The tongue shuts off the current of air from the artificially formed cavity.

"When the mouth is open the tongue rests upon the floor of the oral cavity. However, when it forms the hermetic partition between these curved surfaces which in this case form the oral cavity and the respiratory passage, it points forward and upward, adapting itself closely to the upper front teeth (in case of missing teeth the tongue is pressed through these spaces until it touches the lip), the alveolar process and palate. The root of the tongue rises until it touches the back teeth and corresponding parts of the maxilla. It is very evident that the mouth can remain closed without any tension and uncomfortable drawing of the muscles. The lower surface of the tongue rests upon the rim of the lower jaw and the entire tongue together with the underlying parts are being supported by atmospheric pressure."

The experiments of Metzger have been confirmed and continued by Donders, as recorded in the "Archiv für die Gesammte Physiologie des Menschen und der Thiere."

Donders writes: "While the mouth is closed in the ordinary manner, a flat mouthpiece connected with a manometer by means of an elastic tube is introduced between the lips and teeth and above the tongue almost to the soft palate. This will demonstrate that in the chamber located between the anterior part of the tongue, which is in contact with the hard palate, and the soft palate, which is stretched over the root of the tongue, there exists a negative pressure of 2–4 mm. mercury. If a colored water solution is used the manometer indicates a higher value. . . . .

"Respiration is carried on regularly without exerting any direct influence upon the manometer. To be convinced of this, it is but necessary to increase the inhalation and exhalation pressure by closing the nostrils. Furthermore, a mouthpiece adapted to the form of the tongue may be pushed along the root of the tongue until the respiratory passage is reached. It will be found that this passage is farther back as well as lower than one would suspect. It is here that the palate is stretched downward over the root of the tongue.

"While the mouthpiece is in the suction chamber the fluid in the manometer will show slight respiratory oscillations which are dependent upon the inhalation and exhalation pressure upon the soft palate. If one of the nostrils be closed these oscillations will increase, and they will increase still more if the other nostril is also compressed, without any direct connection existing between the respired air and the existing suction chamber. This suction chamber is closed in front by the tongue. The mouth can be opened, the lips and jaws separated from one another, and still one can plainly feel that the tongue rests against the palate. This suction can be voluntarily increased by first flattening the tongue, then drawing it posteriorly and bending the tip backward. In withdrawing the tongue a sound—so-called smacking of the tongue—is heard. This sound is caused by the air rushing into the suction chamber. If any object be introduced over the tongue into the suction chamber, it will be sucked backward. If this object be hollow, fluids can be drawn into the suction chamber. Enlargement of the suction chamber is brought about by drawing the root of the tongue backward. This is noticeable externally by a thickening above the hyoid. By doing this a negative pressure of more than 100 mm. mercury can be produced. This is the chief feature in the mechanism of mastication.

"For a second experiment a mouthpiece may be introduced between the lips

and teeth and under the tongue. Care must be taken that the muscles are perfectly inactive. In this case the manometer will show no change, or at least but a faintly negative pressure, for in reality no chamber exists. The tongue is in close contact with the alveolar process on both sides; its upper surface toward the front is in contact with the roof of the hard palate; the lower surface touches the floor of the oral cavity; the tip of the tongue and its other sides rest closely against the teeth, to which the lips are adapted on the other side.

"The lips can be drawn in still farther voluntarily and, if they are not pressed together too tightly, some air can be heard rushing in between them. By this suction the front part of the tongue is drawn backward and another suction chamber is formed between the lower surface of the tongue, the bottom of the oral cavity, and the lips. To produce this anterior suction chamber and to observe the suction of the lips, it is not necessary to perform the act of suction. It is sufficient to draw the tongue backward while the mouth is closed in the ordinary manner. Should the teeth become slightly separated the lips will be drawn in.

"We have learned that in ordinary closure of the mouth there is practically no anterior suction chamber. However, in parting the lips a faint sound is heard in consequence of the sudden admission of air, showing that because of the adhesion of the lips a chamber had formed while they were being separated. By a little practice of allowing the tongue to rest against the palate (for the natural move would now be drawing the tongue away) moving the tongue downward a second sound is produced by breaking the adhesion of the lower surface of the tongue to the bottom of the oral cavity.

"Accordingly, we conclude that when the mouth is closed the tongue is drawn into contact with the roof of the mouth chiefly by virtue of its own muscular activity, the lips adhere and the bottom of the oral cavity is also bound to the lower jaw by adhesion. In this manner, as Metzger has correctly stated, the mandible is being sustained. It is immaterial whether the anterior suction chamber containing little air exists, for it is certain that it would form if the adhesions were not sufficient to retain the surfaces in contact with one another—the same condition as in the hip-joint."

These explanations teach us that the oral cavity contains a chamber of small dimension which, if not entirely devoid of air, contains only little air, so that a difference of atmospheric pressure from within and from without exists.

Furthermore, in consequence of this difference of pressure, the outer atmosphere bears upon the walls of this chamber, *i.e.* the lips and cheeks, and these in turn upon the teeth. Though the intensity of this pressure is but slight, it is effective because of its constancy, the mouth being closed the greater part of the day and the entire night.

It is this atmospheric pressure which we are in the habit of referring to as lip pressure and cheek pressure. It is this pressure which retains the mandible in its relation to the maxilla.

It is an old-established fact that this pressure is not the only factor concerned in molding the dental arches; the tongue also exerts a great influence, somewhat antagonistic, as it were, to the cheek and lip pressure. In normal conditions these forces act harmoniously.

The size and shape of the tongue exert their influence primarily upon the lower arch because it rests in the bottom of the oral cavity. Only the anterior part of the upper arch is directly affected by the tongue, and the entire upper arch is only indirectly influenced by it, because the lower arch is the mold over which the upper is formed.

The importance of these factors is reflected in the successes in the practice of orthodontia. Here we may clearly see the influence of atmospheric pressure and its various manifestations. If, after the correction of malposed teeth and the removal of retainers, the desired result is permanently established, or if, on the contrary, the correction has not been effected in accordance with the laws of occlusion, the results must alike be at-

tributed to that atmospheric pressure manifesting itself as mandibular pressure.

In this we also find an explanation for that form of malocclusion so typical of the mouth-breather, expressed as class II, div. 1, Angle's classification. It is plain that in the mouth-breather the chamber which in the normal breather contains thinned air, is missing. Lip, cheek and mandibular pressure are absent; the tongue acts only upon the mandible and upper front teeth. There being no lip pressure, the upper first permanent molar, instead of making its way through the bone tissue between the second deciduous molar and the tuberosity, will push the deciduous arch forward and assume a position mesial to normal, a result similar to that produced by premature extraction of the second deciduous molar. The maxilla will be protruded and narrowed, not because of the tension of the muscles of the cheeks occasioned by the dropping of the mandible, but because the activity of the tongue is missing, and because the teeth can create sufficient space by elongating the mandible; only the tip of the tongue exerts pressure upon the upper front teeth and places them obliquely at an obtuse angle.

It is to be attributed to the atmospheric pressure known to us as lip pressure that the crowded front teeth which immediately after correction appear too oblique, assume the proper slant in the course of time.

It is, therefore, of the greatest importance that the orthodontist should consider atmospheric pressure as one of his important therapeutic measures, and to establish normal breathing and normal atmospheric pressure in the oral cavity he must work hand in hand with the rhinologist.

Discussion.

Dr. J. P. Corley, Greensboro, Ala. We are now beginning to see and recognize the fact that the shape of the dental arch is one of the most powerful factors in the symmetrical development of the face and in all of its far-reaching consequences.

I have for some time been studying the influences which are brought to bear upon the alveolar or dental arch, but I have never thought of this one, and for some time I have been collecting models and photographs of cases which present asymmetry along the line of dental irregularities. Now, if atmospheric pressure can be proved to be a factor in the development of the abnormal dental arch, and we are able to control that pressure so as to obtain symmetrical development of the arch, then we will contribute to humanity one of its greatest blessings, because where there is any lack of symmetry in the dental arch we find a corresponding lack of symmetry in the features of the face. I have been observing deflections of the nasal septum, disparity in the shape of the orbits, and also in the sizes of the maxillary sinuses, and I find that they are invariably concomitant with an abnormal development of the dental arch. I am convinced that not only deflections of the nasal septum are almost without exception responsible for corresponding deflections of the dental arch, but that a great many ocular disturbances have their origin in the same source. We have flattening atrophy, undue elongation of the orbit, and deflection of the visual axes. I believe that if we could interest opticians, oculists, and rhinologists in this cause and obtain their assistance along this line—if we could induce them to keep records and data of the conditions they find in the development of the dental arch, I think we would in a few years work out some scientific principle which might be of great assistance.

I believe that if specialists would keep copies of their models of symmetrical arches and of irregularities, preserve them in a register, and make out data concerning the conditions which they find, we would in a few years be in position to work in harmony to contribute untold benefit to humanity.

Dr. W. O. Talbot, New Orleans, La., This paper is a very interesting one, since it concerns a solution for the cause of cases of class II, div. 1, according to the Angle classification. But

in going over the experiment in accordance with the directions given in the paper, I am unable to arrive at the conclusions therein reached. For instance, if we close the mouth normally and continue to breathe we produce a slight vacuum or have a cavity of thin air in the roof of the mouth. By increasing the vacuum or rarity of the air in the mouth, the cheeks are forced in against the teeth. It is evident to my mind that atmospheric pressure has something to do with holding the mandible in its normal position, and supporting it when the teeth are in occlusion, while if we open the mouth and continue to breathe, the atmosphere is of equal density in the mouth and without, and the pressure is relieved so that we do not have the inequality of pressure that we had before to support the mandible. The stretching of the masseter muscles presses the bicuspids and the molars in, as they are not supported by the tongue from the inside when the mouth is open.

I do not think that unequal air pressure accounts for the disproportion of the arches in the mouth-breathers.

Dr. W. O. Talbot, New Orleans, La., then read a paper entitled "Malocclusion: the Deformity of the Age," as follows:

Malocclusion: the Deformity of the Age.

Malocclusion is the misfitting of the occlusal planes of the teeth when the jaws are closed. This condition becomes a deformity when there is an irregularity in the arrangement of the teeth in the arch, a disproportion or an unnatural development of either or both of the maxillæ to such an extent as to destroy the beauty, expression, and harmony of the features.

Prevalence. The most common external deformities of the body—excepting of course deformities resulting from malocclusion—are humpback, club-foot, inequality of limbs, and hare-lip. All combined, they will sink into insignificance when compared in number with those of malocclusion. One may walk the crowded streets of a city, seeing here and there distorted or disproportioned figures, but if we look closely into every face we will observe that more than 75 per cent. carry an unnatural expression about the mouth, the cause of which is at once revealed to the student of facial expression as related to malocclusion.

Outward signs of malocclusion. The Greek and the Roman types are taken as the standard forms by which we determine the deviation from the natural lines of development of the face. The Greek type—considered the most beautiful—is marked by straight lines joined by short curves, small depression at root of the nose, upper lip short, lips thin and finely cut, and chin round. The Roman type is marked by vigorous lines, more development of the features, chin, mouth, nose, and brow. The Roman may be handsome, the Greek beautiful, and through inheritance the two types may be combined without lessening the attractiveness of the features. The combination of these types make up the varied forms of faces which are often very beautiful and much admired; but under the powerful influences of heredity and malocclusion, the features are frequently made conspicuous and the expression even absurd. The more noticeable defects arising from malocclusion are thinness of face, depressed lips from contracted arches, protruding upper lip and the acute angle under the nose caused by protruding incisors, a defect more conspicuous in the Greek than in the Roman, yet quite common, indeed, in the latter. The retruding upper lip and obtuse angle under the nose of the Greek, caused by retruding upper front teeth, insufficient teeth, or lack of development of the maxilla, is also conspicuous but less objectionable in the Greek than in the Roman, in whom it adds prominence to the nose and becomes absurd. The retrusion of the mandible or lower arch, with the lower lip turned over, an acute or distinct angle below it, is absurd in the Greek but more tolerable in the Roman. The protruding chin, projecting the lower lip beyond the upper and destroying the natural curve of the lower lip in the Greek and the angle in the

Roman, is conspicuous in both types, but less objectionable in the Greek than in the Roman.

Where found. From personal observation I conclude that these deformities are much more common in cities than in the country, though exceedingly abundant everywhere. My experience is not as yet sufficiently extensive to make a comparison between different sections of the country.

Causes. The two great divisions of causes of malocclusion are (1) those which are inherited and (2) those which are acquired. The acquired causes are by far the more common, and the dental profession generally agree that under this head should be classed: Premature loss of deciduous teeth, prolonged retention of deciduous teeth, loss of permanent teeth, tardy eruption of permanent teeth, supernumerary teeth, habits, disuse, nasal obstructions, and abnormal frenum labium.* When these influences affect only the position of the teeth and the width of the arches, the assignment of the proper cause is not difficult. The influence of heredity upon the shape of the teeth and general arrangement in the arches is not difficult to trace; but the line is very indistinct which separates the inherited from the acquired influences which operate in the disproportionate development of the maxilla and the mandible as expressed in the protrusion of one jaw and the retrusion of the other. The causes of supra-occlusion, infra-occlusion, and of torsion are also indefinite. There is a difference of opinion among members of the profession—among orthodontists in particular—as to the cause of certain facial deformities that are dependent upon the size or the position of one dental arch to the other. Upon the determination of the exact causes of all facial deformities that are in any way related to malocclusion of the teeth will depend the success or the failure of the orthodontist. These causes must be determined in accordance with the rules of normal occlusion and facial harmony. I would therefore suggest that a competent committee be appointed by this congress to tabulate the causes of facial deformity as related to malocclusion of the teeth.

Prevention. It is not enough for the modern physician to treat only the symptoms of a disease; he must know the cause and remove it if possible, to prevent spreading or recurrence. The highest ideal in medicine is the prevention of disease; in dentistry, the prevention of decay of the teeth and of all diseases of the oral cavity; so the highest ideal of the orthodontist should be to prevent malocclusion and facial deformity. To prevent, we must know the cause. Dentists are the instructors of the people in the care of teeth; and so every graduate in dentistry should acquire a knowledge of the fundamental causes of malocclusion as known to the profession, in order that he may instruct his patients and may so operate as to cause the least deformity. If a college does not instruct pupils with this end in view, it fails in its duty to prepare graduates for a work which the people have a right to expect from this honored and scientific profession.

*Angle, "Treatment of Malocclusion of the Teeth and Fractures of the Maxillæ."

Second Day—Tuesday, August 30.

The Chairman, Dr. Angle, called the meeting to order at 2.30 P.M. and Mr. Edmund H. Wuerpel of St. Louis, Mo., delivered a lecture entitled "Art as Applied to Orthodontia," as follows:

Art as Applied to Orthodontia.

It is with much diffidence that I approach the subject assigned to me, for it is almost impossible to collect in one lecture all the data that should be given to properly present the subject to you.

The application of the principles of art to the subject of dentistry may seem to the average layman a field too widely separated to allow of special treatment; but I have found to my great delight that the principles of art are more or less directly connected with very many of the trades and almost all of the pro-

fessions. In some instances these applications are very much more obvious at first glance than in others; but it ought not to take a thinking mind very long to trace the relation between dental science and the art of beautifying the human countenance.

In prehistoric times, when the races of mankind were fewer and national traits of character less complicated, the possibilities of placing art on a purely scientific basis might have been considered. For instance, taste, that tremendous factor in the appreciation and understanding of the beautiful, was a very simple matter. Indeed, from the records preserved for us we find that art in the stone, iron, flint, and other ages *did* follow certain fixed rules, laws, and standards. The human race was less complex then than now, and that which pleased one was not unlikely to please the multitude. So the decorator could apply certain preconceived laws which were very apt to meet with universal approval. Then, too, his types were, from force of circumstances, very much akin, for we find in the lower development of the human race very much the same characteristics which we find in the lower order of animals—more or less a fixed type. So if an artist caught, no matter in how crude a form, the racial characteristics, he found that a single type of head and figure would suffice for the entire race. Therefore it is not unlikely that he created for himself and his successors certain rules and standards by which he allowed himself to be guided. We see this in certain types of the Peruvian, Aztec, and Indian tribes, and we see it still more marked in nations of a much higher standard of civilization—the Assyrians, the Phœnicians, the Egyptians, and the Greeks.

How much the traditions of past ages had to do with establishing the standard of the higher types of peoples it is difficult to state. But even in the races mentioned it is not unlikely that standards or fixed rules were adopted because the types of men and women lent themselves to rules. Thus the Assyrians used an almost universal method of dressing the hair and the person in each of the different classes of the population. These differences were strongly and clearly marked and were invariably the same, so that for a certain class of Assyrians a certain distinctive type was accepted. This led to the adoption of laws which evolved standards.

So it was in the case of the Egyptians. To those who have studied the Egyptian hieroglyphics there is no trouble at all to distinguish between royalty, nobility, freeman, and slave. The standards were absolute and all artists had to conform to them.

In the case of the Greeks there was increased freedom with increased mental development, and although we see an absolute casting aside of conventionalities in regard to movements, drapery, and composition, we still feel a fixed type in the faces and figures. This may be attributed to the fact that the Greeks glorified their gods in their art, and naturally the tendency was to create types in the different gods and goddesses; thus we have the Juno, the Venus, the Mars, the Jupiter, and many other types. Not only the gods but the demigods and all mythological characters were given certain typical standards; so, knowing the laws governing the cases, we have no difficulty in recognizing a Diana, a Bacchus, a Bacchante, a Hercules, or a Hebe.

Thus it was easy for the Greeks, and the Romans who followed them, to establish certain set standards not only for the figure but for the head as well. These standards were admirably adapted to the people who created them, but it is not possible for a twentieth-century individual to adapt himself or herself to the Greek or Roman standard. Our lives are different, our individuality is a thousandfold more marked; with individuality come ruling passions, which to a great degree mark the facial development of man. Thus it is that we exclaim in a crowd, "See that man yonder; he looks like a lawyer, or a doctor, or a banker. That woman must be an actress, a singer, a clerk, or a bookkeeper," meaning that people in certain fields of life develop certain traits of character, are actuated

by similar motives, and develop, in consequence, certain typical lines of face and very often of figure. The wrinkles in a man's face often betray the manner of his thought, and this universality of thought in given fields has made it possible to produce those interesting studies or experiments in composite photography which were so much talked of some years ago. Now this is just exactly what the Greeks did; without the aid of the camera they created composite types, and really adapted them admirably to the subject they happened to have in hand.

But it would require endless research and time to even begin to typify the modern civilized races of man. The complexities are too great, the fields too diversified and scattered, to allow even a thought of classification and arrangement in any but the broadest manner.

Even so long ago as the Spanish renaissance we find that men have tried to typify certain subjects. This was made possible by the Spanish inquisitors in the case of religious paintings. The church became the chief patron of art; not only was it the chief patron, but the chief producer as well. The painters themselves came from among the priests and monks, and it became a comparatively easy matter to establish fixed rules to govern them in the production of their works of art, and we read nowadays with certain smiles of superiority the rules established by Pacheco, that famous father-in-law of the more famous painter Velasquez. We read of such things as follow: "The Infant must always be decently clad and must be covered, because St. Joseph had ever been sufficiently well off to pay for necessary garments." The arrangements of the drawing, the composition and the color in each of the various representations of the Virgin were strictly set down, and heavy fines and penances were exacted from all painters who did not conform to these rules. In this case, too, we can easily understand the possibility of such universality of treatment, for the people were narrow and ignorant to an extreme degree. The church was most powerful, and all laws governing the people emanated from the church. But even this uncivilized condition did not last long. The people might have submitted to the exactions of the church for a longer period of time, but the artists themselves rebelled. The king of Spain, Philip IV, was forming his great collection afterward known as the "Prado," and for this purpose drew largely from all the galleries of Europe. Not only pictures, but artists from all countries came to the court of Andalusia. Spanish painters under the patronage of Philip cast aside little by little the restraining influences of the church, and during the time of Goya not a single vestige of the rules of Pacheco were to be found in the art of Spain.

This was the last attempt ever made to create fixed laws and rules for art—to create arbitrary standards; and we of today, in the face of complex and constantly changing conditions cannot possibly see the way open to fix rules of any kind. Even the laws of composition which during the great renaissance period were universal throughout all the civilized regions of Europe are today cast aside to be used only when the convenience or lack of originality of the artist require them.

The outgrowth of civilization seems to be to create a law for each individual, and that law is governed by the temperament of that individual. It is so in business, it is so in education, it is so in the private life of the family, and it is so in art. We can no longer say that certain laws must govern all students. It is being questioned in many of the advanced institutions of learning whether the methods of examination which for so many years, we might almost say centuries, have been employed to determine the mental status of the student are not based on a false principle. Human beings have risen above the grade of cattle. They can no longer be driven in herds, as atoms in a great unit. They are units in themselves, and any attempt to treat them otherwise results in utter confusion. So all rules governing such a condition of the human race must be applied with great forethought and prudence. We

must not only consider racial characteristics, but in addition we must consider the individual, and above all the particular type to which a person belongs. It may become more evident what this means when you see some of the types which will be presented to you on the screen. You will agree with me that no special rules can be applied to any of them; that it is a question of balance, of symmetry; that only the laws of reason can be applied—and reason means a great deal of common sense, and ability to put it into practice. So we will consider this matter with the aid of the slides which are to follow.

Before closing his address Mr. Wuerpel showed on the screen a number of cases of irregularities of the teeth, showing them before and after treatment; and in speaking of the best way of correcting the irregularities so as to produce the best results he said that no rule could be laid down—that it is simply a question of balance, and that any correction must be made with a view of maintaining the balance of all of the other features, likening the irregularities to dishes on a tray which were unbalanced and which needed to be adjusted in order to retain their places without being displaced or displacing others.

Discussion.

Dr. S. E. Dodson, Grand Rapids, Mich. I would like to ask what is the relation of the upper and lower lip in the two types, the Greek and the Roman, as to prominence. In the Greek type does the upper lip have a more prominent aspect, and in the Roman the lower?

Mr. Wuerpel. It depends on the state of balance. You have to study the face. I purposely made that point of the tray with the plates on it to show that you must try to feel what part is being shoved out and what is not.

Dr. Dodson. I am speaking of ideal types.

Mr. Wuerpel. In both the Roman and the Greek the upper lip should slightly protrude over the under.

The Chairman. The next paper is by Dr. Wm. Slocum Davenport, of Paris, France, "Correction and Prevention of Malocclusion by the Bite Guide and Other Methods." It will be read by his brother, Dr. I. B. Davenport, Paris, France, the writer not being present. [This paper was published in full, with illustrations, in the Dental Cosmos for March 1905, page 301.]

Discussion.

Dr. L. S. Lourie, Chicago, Ill. The essayist wishes to present three points for our consideration, the first being the appliance which is termed the bite guide, the second a retractor of twisted wire for retracting incisors, and the third a recommendation for the employment of finger pressure for early establishment of teeth in position in younger persons.

From the presentation of the cases it is apparent to me that the appliance presented here, which the essayist states was elsewhere presented by Dr. Ainsworth, is applicable to only a small variety of cases.

The essayist says that the arch must be straightened first—must be placed in proper "arch relation" before the bite is jumped. Since this is necessary, it seems to me that the bite might be jumped at the same time that the arches are being expanded and the occlusal plane of the arches restored. The first three cases show conclusively that this appliance is effective in these cases. The time required ranges from six to eight months to a year and a half. I think the appliance must be very uncomfortable to the patient, and even though the patient become accustomed to it, the interference with speech must be material. An appliance of this kind may be used effectively as an aid in truing up the occlusal plane of the arch before the bite has been jumped; but I gather from some remarks the essayist has made that he does not thoroughly understand the use of the intermaxillary rubber ligature. In one of the cases illustrated (Case V) the expansion arch is used and supported upon the bite guide plate upon the labial

side. This is to "prevent the elongation of the incisors which would otherwise naturally take place." Now if the expansion arch were placed below this spur it would operate much more effectively.

The retracting appliance shown in connection with Case IV is, I think, a very unscientific appliance, and I am surprised that it should be brought forward at this stage of development in simple and effective appliances for the treatment of malocclusion. In most of the cases where the anterior teeth are to be retracted some provision must be made to provide room for them; the arch must be expanded laterally. This appliance, which is simply a wire ligature passed from the molars around the anterior part of the arch and then twisted to retract the incisors, makes no provision for the lateral expansion of the arch, and consequently cannot be very effective in retracting incisors. The anchorage is not sufficiently stable. A retractor that is simply attached by means of a wire ligature is apt to move the molar forward in retracting anterior teeth; a simple anchorage is used where a stationary anchorage should be employed.

The third point which the essayist wishes to bring out is the necessity for finger manipulation of the teeth in very young patients in order to prevent irregularities or to correct simple cases which are just beginning. He cites two cases in which he has just begun such treatment, but he does not show any results. We all know that finger pressure upon the incisors has been a common practice for a good many years; many present may have tried it. Possibly some have met with good results, but the essayist does not report any results; he simply shows the two cases. I cannot quite see in what way the cases shown may be of special benefit to us. In one case—the subdivision of class II according to the Angle classification—in which there is unilateral distal occlusion, efforts were made to correct the malocclusion by applying force to the incisors or canine on one side, to push distally one entire half of the upper arch I think it is not probable that finger pressure will remedy the defect. To restore the normal position of the teeth by finger pressure is necessarily a very slow process. I think it is advisable to put on an appliance, a simple one, that will be effective in a short time, the patient using the teeth as nature intended they should be used. I believe that would be more effective in preventing malocclusion or correcting a slight malocclusion that already exists.

In conclusion I desire to say that the essayist is to be complimented on the results he has obtained with the bite guide in younger patients.

Dr. H. A. Pullen, Buffalo, N. Y. My first acquaintance with the casts exhibited by Dr. Davenport was made a few moments ago, and the cases shown do not prove conclusively to my mind that the essayist has as well performed the operation of jumping the bite as we do with simpler appliances. It seems to me that he has arrived at a part of the truth, but that he has worked with a greater number of appliances than necessary. We can jump the bite with simpler appliances. I think the jump-bite appliance might better be used as a retainer than as an appliance for doing the operation. I have little faith in an inclined plane for performing these severe operations in orthodontia. I think we need a greater amount of anchorage, a firmer and more stationary anchorage, and I think we have a greater range of operations to accomplish than would seem to be called for by the use of this one appliance. As Dr. Lourie said, the change of the shape of the arch in the movement of individual teeth cannot be done with the jump-bite appliance as illustrated by the essayist.

Regarding finger pressure, I do not think it accomplishes much. I have had many cases where doctors advised it, and nurses have tried to accomplish it, but it did not amount to much. I think a dentist working on his own child might appreciate the results obtainable by finger pressure. The only case I know where it did any good was in the case of a young man working in the dental office.

He had a wooden cigar which he held between the teeth to force out an upper central incisor, which he finally accomplished after months by holding it between the teeth and forcing it downward against the lower arch as a fulcrum.

Dr. K. A. Davenport, London, Eng. Perhaps I should apologize for speaking on the paper at the present time, but it seems to me as though a wrong impression has been taken, because of the paper not being properly illustrated. The essential points have been missed. I have been using this appliance for a year or a year and a half, and at the present moment have some eight or ten cases under way. The essayist I think intended to convey the idea of using this appliance at an early stage, and in that respect my practice has been to put it on as soon as I have found the malposition of the first molar established, before the bicuspids appear in place at all. In some of my cases the bicuspids are beginning to come, and I find that the jaw takes position, the first molar becoming normal in a very short time, and the bicuspids will fall in line; that is, good normal occlusion.

Dr. Lourie speaks of the discomfort in connection with this appliance. He speaks of it as being a complicated appliance. I don't know what he means by that. Certainly two bands on the incisors with an extension is not a complicated appliance. It is not more complicated than bands in other positions. My practice has been to use this appliance very much as my brother has described it, and after forty-eight hours, in children from seven to ten years of age, I have never had any complaint as to discomfort.

For a girl of twelve, I found it necessary to increase the anchorage, which I did by banding the canines as well as the centrals. The lower incisors and canines were made to take a normal position through contact with the bite guide. In a few weeks the excessive curves in the lower arch had disappeared, the incisors having shortened and the bicuspids and molars elongated, thus producing an excellent locked bite. I have kept it in place as a retainer, and after six months find it impossible for the child to bite back.

There are certain cases where I have found this appliance especially useful, viz, where the teeth are seemingly too small for the arch, in children who are not well nourished. Through the bite being opened the teeth are allowed to move forward, which closes these objectionable spaces and overcomes that weak expression which is so difficult to master with other appliances. They go on for several months and patients are able to go away for six months at a time after the first few weeks and I can feel that they are perfectly safe.

The Chairman. I would like to ask the doctor if he would apply that sort of appliance to a patient eighteen or twenty years of age if the case was well pronounced, or whether with a young patient he would be able to correct with that method alone a well-established typical case belonging to that category?

Dr. Davenport. In pronounced cases with contracted arches I would make use of other appliances; personally I should employ other appliances, but I look upon this method as one of prevention; in many cases its employment would obviate the necessity for further treatment.

A Member. I would like to ask how the essayist induces the patient to wear the appliance of twisted wire. It seems to me that it would be an exceedingly unpleasant one to have in the mouth.

Dr. I. B. Davenport (closing the discussion). The purpose of the paper is to show that this appliance, while effective in itself, is not an apparatus to be used exclusively; its use may, however, be supplemented by others, or other forms of appliance may be employed.

In regard to twisted wire, the patients have not objected to twisted wire more than to ordinary bands. There is no difficulty in that respect.

(To be continued.)

SIXTH, SEVENTH, AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

Thirty-sixth Annual Convention.

(Continued from page 505.)

SECOND DAY—*Morning Session.*

The first paper on the program for the second day's session was read by Dr. G. B. SNOW, Buffalo, N. Y., entitled "Dental Education," as follows:

DENTAL EDUCATION.

The rapid advance which the science of dentistry is making calls for a more thorough preparation of those who are fitting themselves for its practice as a life-work. Fifty years ago the few dental colleges then in existence had a curriculum consisting of a two-year course, with a term only four months long in each year. There were but two classes receiving instruction, and the teaching was the same for both classes so far as lectures were concerned. There was no standard for preliminary education, excepting possibly that the acquirement of the three R's may have been recommended. Since then the course has been lengthened to three years, the terms have grown to seven, eight, and even nine months, and indeed a few colleges have a course of four years. At the present time attention seems to be directed to the lengthening of the dental course as a means for raising the standard of education, but the necessity for looking to the foundation upon which this superstructure of learning is to be raised is in a measure lost sight of.

In fact, it is only within a very few years that any special attention has been paid to this very important matter of the preliminary education of dental students. In this state it was made a matter of legislative enactment, the Board of Regents being entrusted with its furtherance. In the year 1894 the very modest demand was made that dental students matriculating as freshmen must, at the beginning of the next term, file a certificate that they had been awarded six regents' counts—these being the equivalent of instruction in a registered high school for half a term. The next year this requirement was doubled, and it was still further increased until at the present time a dental student must, at the beginning of his second term, present to his dean a dental student certificate showing that he has had three terms' tuition in a registered high school, or must have obtained thirty-six counts by taking the Regents' examinations. Outside of the state of New York the standard is generally lower, two years' instruction in a high school being deemed sufficient to entitle a student to take up the study of dentistry and to graduate after having finished his course.

The anomaly is here presented that it is entirely possible for this preparatory work to embrace a selection of subjects which have no bearing whatever upon the sciences and arts upon which dentistry is based—so that the benefit derived from all this amount of study is limited to the increased aptitude for study and the mental drill. The student enters the dental college with everything to learn, and nothing to show for all the time previously spent in school but an increase in his ability to master the subjects to which his attention is directed. Indeed, in the course of a discussion as to the advisability of increasing the length of the dental curriculum to four years, the proposal was recently made by the dean of one of the best and most

successful dental colleges in the country, that the first year be devoted to a line of subjects which are, or should be, taught in high schools, that the student might have a proper understanding of them before proceeding to his dental course.

The field of learning which is now covered by dentistry, and the number of subjects which must be brought to the attention of the student, is so great that it is no wonder that the first thought is that it is necessary to lengthen the course. It may be that, in the end, this will be found necessary; but the contention is made that it will be better to first put the student into proper condition to receive what it is proposed to teach him. The uses of electricity in dentistry, and the methods of managing this subtle agent, cannot be well comprehended unless there be a well-grounded knowledge of physics to begin with. A large part of materia medica is much more easily comprehended if its study be preceded by that of botany. Prescription-writing almost necessarily implies a knowledge of Latin on the part of the writer. A knowledge of English is required before one can express himself creditably, either by speech or on paper. Yet these subjects, which are so necessary as a basis for a good education, have no place in a dental course. That they are not always successfully mastered by students before taking up the study of dentistry is well known to anyone whose duties call him to read over examination papers. The grammar and spelling in these are oftentimes atrocious.

The misapprehensions which are shown by the students often arise from the attempt to master something when at the same time no previous attention has been paid to those subjects which underlie it.

It is only within a very few years that the public schools have taken up the subject of manual training. Under the name of "shop work" it is recognized by the Regents, and an allowance is made to those who have received instruction in it. As manual dexterity is of the first importance in the practice of dentistry, this subject requires much more consideration than it has received. The education of the muscles which gives the ease and dexterity so necessary to the dentist can scarcely be begun too early in life. The proper handling of the tools commonly used in ordinary mechanical vocations, if well understood, greatly facilitates the learning of the delicate manipulations which constitute a great part of dental practice.

Next January the requirements in this state as to preliminary education are to be raised to four years' high-school work, or forty-eight regents' counts. These counts may be obtained by passing examinations in any of some seventy-eight different subjects, some of which have no bearing whatever upon anything connected with dentistry. The raising of the standard is therefore more apparent than real, the situation remaining practically the same as has already been described as obtaining with the requirement of thirty-six counts. A much less requirement would give to the colleges students better prepared for their work if certain subjects were made obligatory. For instance:

A good knowledge of the English language should be imperative.

Enough of Latin to enable the student easily to comprehend anatomical terms and prescription-writing.

A knowledge of plane geometry, necessary to a comprehension of mechanical principles.

A thorough knowledge of physics.

Whatever is taught of chemistry and physiology in the high schools.

Some knowledge of drawing.

In addition to these, a course in manual training and an acquaintance with the tools ordinarily used in working wood or the metals. This should be carried far enough to give assurance that the student has the mechanical tact and ingenuity which are so necessary to the dentist. These faculties are born with the child, and there are some who do not possess them. What folly it is for anyone destitute of them to essay the practice of dentistry—a calling which demands the greatest fertility of resource combined with ingenuity in order to secure the best results.

There is yet another qualification of which a dental student should be assured before commencing his studies—that of perfect, accurate sight. It is not so infrequent that a student does well in his first year, and until he is set to work in the infirmary; then he is found to be incapable of filling a tooth well simply because of his imperfect sight; or it may be that he does succeed, after a time, only to find that the strain upon his eyes is more than they will endure.

It needs no argument to convince anyone who understands the situation that a young man who could pass the examinations and tests here outlined would be better qualified for success in dentistry, under proper teaching, than one who could successfully pass a Regents' examination on subjects taken haphazard from the list, but whose physical characteristics had received no attention whatever.

And now a word as to the length of the course. An effort has recently been made to increase it from three years to four, which has failed simply because it was not well considered. When a building is to be erected, a firm, unyielding foundation for it must be prepared, or it will be very apt to fall into ruins after a time. So, in the matter of education, we must have a foundation of good grammar-school and high-school instruction, possibly a literary course in college besides, before we can proceed to the superstructure of science. This matter has been ignored so far as the dental curriculum is concerned. The Association of Dental Faculties has a standard of preliminary education of only two years of high-school work, which is insufficient at the best, and owing to the low standards of instruction in some of the states is in those states wholly inadequate. The National Board of Dental Examiners is making a strong fight for a lengthened dental course, but is silent upon the matter of preliminary education. It is contended that the first movement should be to raise the preliminary standard, for the need for it is most obvious.

A short time ago there was a contrast made between the results of dental teaching of twenty or more years ago and that of the present time, with the conclusion that "We made better dentists then than now." The fault with this reasoning is that the comparison is made between the best men of earlier days, who have been students ever since they obtained their diplomas and who have gained the experience and judgment which only comes with practice and deep thought, with the results shown by younger men who have yet to follow the path trod by their older brethren. All men do not attain success in any profession. The possession of a diploma only opens the door, and progress beyond it is only to be gained by work. The hill of eminence is steep, and he who climbs it must not lack in energy and application. The dullards and the lazy are to be found in multitudes around its foot.

Those men who have succeeded did not have a four-year course—many had but two years; but they have succeeded. If a four-year course were adopted, only those would succeed who continued to be students after they had taken it. Others would become routine practitioners, some neither very good nor very bad, and some would fail utterly, the same as under present conditions.

What, then, should be the length of a course? It should be long enough to impart the requisite instruction to the diligent, apt, and painstaking students. When these become fit to practice they should be sent forth. Their detention in the school for a longer time would be a hardship and an injustice to them. And it is maintained that, if instruction be properly given, this is accomplished with a three-year course. If a little more time be needed, let the terms be lengthened and the vacations shortened. A long vacation may be an excellent opportunity for the student to go into some employment outside of dentistry and earn money, but it is also an excellent opportunity for him to forget much of what has been taught him. Let the course remain as it is, at three years, and raise the standard by increasing the

rigidity of examinations at all the terms. If a freshman does not make satisfactory progress, advise him to follow some other pursuit. Set a high average for the senior final examinations, and look well to the quality of the practical work done. Those who pass will be fitted for practice. Those who are careless or incompetent and who cannot attain a high average in their examinations are the ones who need a fourth year, and they should be made to attend it, going over all the required work the same as the first time. If a higher preliminary requirement be insisted upon, followed by more thorough teaching and more rigid examinations in the dental colleges, then the standard of dental education will be advanced.

But good results cannot be expected if students are graduated who attain only an average of fifty per cent. upon their final examinations and are accepted when their preliminary educational attainments are deficient.

Discussion.

Dr. C. S. Butler, Buffalo, did not recall having read or heard anywhere a presentation of this subject which more nearly conformed to his own opinion of the necessity for advanced dental education today than the paper just presented. Any discussion of it, therefore, would simply be an amplification or extension of some of the ideas presented by the essayist. He thought it a great gain for dental education today that the dean of one of the leading dental schools of the country had the moral courage to stand before an audience and present the subject in such a manner as the essayist had done. He was sure that all present would agree with him, if they had followed carefully the discussion along this line during the past five or ten years, that the ideas of Dr. Snow were considerably at variance with those of the majority of deans of dental colleges. The educational system seemed to have no strength and little depth of foundation upon which to build the present superstructure, and he did not think that anyone would for a moment contend that education of any character for any profession conceived and carried through on those lines was the best for that profession. On the contrary, he thought all must agree that the profession which best educated its students, and started them out with an adequate and proper foundation, would present a larger percentage of conspicuously successful men than any other.

He had never been an advocate for the four-year dental course. He had never felt that the time had come when it was wise for our dental colleges to make that advance. He thought it was not a sufficient argument on behalf of the four-year course to say that medicine calls for it; that the National Association of Dental Examiners demands it; nor that the other learned professions require it. Medicine embraces all that is covered in the general practice of medicine and surgery; dentistry, on the other hand, is a very circumscribed field of professional activity; it runs through a very narrow channel as compared with the broad field of medicine and surgery; therefore, to say that it is necessary that the dental student should devote as much time to the didactic work in dentistry as was demanded in the case of medicine was to him a fallacious argument. That the National Association of Dental Examiners should demand a four-year course without any reference whatever to preliminary requirements seemed to be unwise, perhaps ill-considered. They were ignoring absolutely the foundation upon which the superstructure was to be built, and he believed with the essayist that it is there that the work in strengthening and building up the system of dental education has to begin.

There are several ways, it would seem, in which dentistry must proceed if it is to count among its members thoroughly trained men. In the first place, one of the most valuable agencies in bringing about that result is to be found—and this was a little outside of the province of the paper, but he wanted to bring it in because he thought it important—in the loyalty and cohesion of the alumni of any

dental school. The deans of the dental schools say that there is nothing which gives them so much encouragement and so much assistance in carrying out their plans for the advancement of dental education as the knowledge that they have not only the sympathy but likewise the hearty co-operation and support of the graduates of their school. In other words, schools which cultivate this spirit among the students cause them to have the highest regard and love for their alma mater; they are zealous that she shall receive as students only the best men and women; they insist that their alma mater should select her students from an environment where, both by precept and example, the young men should be men of sobriety, men of character, and men who have the moral support of the neighborhood from which they come, so that when they become members of the profession they will be a credit to their alma mater and to themselves. The speaker said he often thought of a remark that Daniel Webster had made before the United States Supreme Court on one occasion when pleading a cause for his alma mater—one of the smallest colleges in New England. He used this expression: "She is a small college, but there are men who love her." And that, he said, was the spirit which every man should have for his alma mater. That spirit could come only from a hearty co-operation between the institution and its graduates, with the determination to accept only those boys as students who attained the highest standard of proficiency and excellence both as regards moral and professional character.

He feared he had talked too long, but he believed it was along the line of argument presented by the essayist that we were to look in the future for the development of dental education. A few of the dental schools were perhaps in a position under the present conditions to demand the four-year course in order to bring the department into harmony with the other departments of the university. He was glad that they could take that position and hoped that they could maintain it, but not for the purpose of making the four-year course obligatory upon every dental student. He thought it was well to provide a four-year course for the brightest and best men in the study of dentistry, that they might be able to go farther and do work which was beyond the average student. He said he had looked forward for years—and he had spoken on this subject many times—to the time when at least we should have one dental school in the country where the brightest and best of our students might go and there carry their studies and investigations beyond the point to which the schools that prepare and turn out the average man carry the student. Not a post-graduate school, but a place where higher and better work could be undertaken because the men were capable and fitted to pursue the higher standard.

Dr. Wm. Jarvie, Brooklyn. The paper expressed very definitely a sentiment seldom heard from the educators of dentistry. Almost every paper and almost all remarks coming from educators had been expressions the reverse of those presented in the paper. The usual stand taken by educators had been that of asking for a low standard of preliminary education and a longer course in the dental schools, while he had always felt that the young men should be well grounded before going into the dental schools; the professors would then have much easier work, and would turn out better dentists. He assured the essayist that so far as the Board of Examiners of New York was concerned he would have their hearty co-operation in his efforts for higher preliminary education. With regard to what the essayist had said with reference to the necessity for obtaining thirty-six counts, which the student must have before matriculation, he said the Regents had been desirous of arranging a special course which would give to the student an education on the lines which would fit him for his studies in the dental school, and he knew that the president of the Regents had offered suggestions in that direction to the deans of different schools, not only in the state of New York but in other states, looking

forward to providing just such a course of study. He felt satisfied that the Regents would be glad to receive any suggestions coming from Dr. Snow on this subject, and, judging from the paper just read, he thought suggestions of that character could not come from a better source.

Dr. J. A. Libbey, Pittsburg, Pa., expressed his appreciation of the value of Dr. Snow's paper, inasmuch as he had been for twelve years in the work of the State Board of Dental Examiners in Pennsylvania, and by reason of that connection he realized the necessity for higher dental education, and realized also that a great many of the students taken into the schools had not the preliminary education required by the National Association of Dental Faculties. The requirements of the association seemed to him to be rather elastic, but he believed that at least in a great many of the schools there had recently been considerable improvement. He did not see how it was possible to live up to the educational requirements advocated by Dr. Snow until the dental schools were supported otherwise than they are at present —that is, with the great number of independent schools we have today. It was a matter of business with them, and the commercial spirit was so strong in many that they were unable to refuse a student even if they had to stretch and even violate the requirements they had agreed to in the National Association of Dental Faculties.

He hoped to see the day when we should have fewer dental schools and when these should be in connection with our great institutions of learning, and not conducted, as many were at present, on a strictly commercial basis; so that when the student was found deficient in certain branches he might be able to take up and study those branches in connection with his dental course. When that foundation was built, as Sir Michael Foster described it in the case of the educational cone—when the fundamental branches were taken up and the student was thoroughly grounded in the necessary branches for our profession—he felt that we would have fewer failures than at present among the graduates that go before the state boards. He said he had retired from the work of the state board about a year ago, and up to that time the failures before the board were twenty-three per cent., and this was one of the reasons why he thought there were too many schools and too much commercialism.

Dr. H. B. Huver, Buffalo. With regard to the commercial feature, he thought Dr. Snow was to be the more commended for the reason that when he urged that the requirements be raised he was hurting his own school financially. The schools in New York were already at a disadvantage in this respect, as the state law required that every man who graduated should have the full thirty-six counts required by the Regents two years before he graduated, whereas in other states there is no such law as this, and they might graduate a man regardless of his preliminary education. In regard to manual training, he thought all would admit that it would be desirable to make this a requirement, but he thought it would militate against the applicants coming from small towns. In the larger cities a manual training course was taught in the high schools, but in the smaller towns the students did not have the benefit of such a course. With regard to manual training for the medical student, he thought that if every man who is going to practice surgery could have the benefit of several months' experience in the clinical room of a dental school, it would be worth more to him by far than a great many of the intricate subjects he had to study at present.

Dr. Snow, in closing the discussion, said there was one thing to be said on behalf of the National Association of Dental Faculties in regard to this question, and that was that the selection of students for admission to the schools, so far as the preliminary examination was concerned, was taken out of their hands by their own motion. The time was when the colleges could take a man on their own examination, whereas now it was in the hands of the state educational

officer to determine whether the applicant came up to the requirements or not. That was a good step as far as it went, but it did not go far enough. The regulations of the Faculties Association only require two years of high-school work, and this he did not think sufficient; the New York state requirements are better than that, but of course that was the best that could be done for the present.

The financial aspect of the question is one which stands very much in the way of advancement in this cause, from the fact that anybody who wished could start a dental school, and many of them were started strictly for financial purposes. He thought there should be some state regulation which would prevent a school being started unless there was a good reason and need for it. The Faculties Association was doing its best to prevent too many schools being organized, by not admitting them to the association unless they were fully equipped and prepared to do the work.

There is another thing very much in the way when it comes to raising the standard of education, and this is felt in New York more than in any other state, as the requirements are higher there—having a three-year high-school course requirement as against two years in other states. If the New York schools graduate a man he cannot obtain a license to practice without showing that he had the required thirty-six counts two years before graduation, whereas graduates can come from other colleges outside the state and take the examination without having to show this preliminary qualification. He thought, also, that there was another point on which the law was defective; for instance, the law allowed anybody to practice who had worked in a dental office prior to 1895, and if a person makes an affidavit to that effect he can go before the board and be examined for his dental license without having a dental college or any other preliminary education. In this way, he thought, there were many men wholly inefficient who managed to get licenses to practice.

The subject was passed, and the next order of business was the reading of a paper entitled "Forty Years' Reminiscence," by Dr. C. W. Stainton, Buffalo, N. Y.

After the reading of Dr. Stainton's paper, motion was made and carried to adjourn until the evening session.

Second Day—*Evening Session.*

The meeting was called to order at 8 o'clock Tuesday night by the president, Dr. R. Murray.

The first order of business was the reading of a paper by Dr. H. A. Pullen, Buffalo, N. Y., on "Malocclusion: Illustrated with Lantern Slides."

Dr. Pullen described his method of correcting irregularities according to the Angle system, and showed on the screen some very beautiful results obtained in his practice.

The next order of business was the reading of a paper by Dr. E. C. Kirk, Philadelphia, Pa., on "The Formation and Disintegration of the Calcific Constituents of the Teeth."

Dr. Kirk's contribution was an illustrated talk on the physiological process by which the calcific structures of the teeth are built up and the mode by which they are disintegrated under pathological conditions. The lecture dealt first with the process of normal formation and the histo-chemistry of the production of calco-globulin and the laying down of this material as calco-spherites in the production of the enamel rod. After the mode of formation of enamel and dentin had been discussed, a study of the mode of disintegration or dissolution of these structures under the influence of carious action was elaborated; and finally, the effect of slight but continuous stimulation of the dental pulp, resulting in abnormal increase of the functional activity of that organ, formed the concluding portion of the address.

The various phases of the subject were illustrated by appropriate lantern-slide projections.

Discussion.

Dr. G. W. Cochran, Erie, Pa., asked Dr. Kirk if he understood him to say that calco-globulin and pulp-nodules were one and the same thing.

Dr. Kirk said that the difference between pulp-nodules and calco-globulin was practically the same difference as between the bricks and mortar of a wall and the wall itself. That is, the pulp-nodule was almost pure calco-globulin in composition. The calco-globulin was the material out of which the pulp-nodule was almost exclusively made.

Dr. Cochran said that the reason he asked the question was because of an incident which occurred in his practice a few days ago. A lady came into his office complaining of an aching tooth which had had a cement filling in it for a number of years. He diagnosed the case as a tooth with a dying pulp. After the filling was removed the tooth was not sensitive, but after drilling a little he found it responded. He concluded that there were pulp-nodules in the tooth, and made an arsenical application. The patient returned the next day and he found three pulp-nodules in the pulp-chamber and in the distal root; the remainder of the pulp was in a hardened condition. He said the question in his mind was whether that cement filling had caused an irritation to the pulp and produced those nodules.

Dr. Kirk said there was no filling material which was a perfect non-conductor, and therefore when any filling was placed in a tooth, if the tooth was a little sensitive upon taking cold water, we were in the habit of telling the patient that this would pass off in a few days, after the tooth had become accustomed to it. But this passing-off process means that there has been a laying down of calcific material, which is nature's mode of insulating the pulp. This he thought had a bearing particularly on the question as to whether or not it was better practice to remove the pulp from a tooth to be used as an abutment for a bridge or crown. On general principles he thought it better practice to remove the pulp and avoid the possibility of troubles being produced by this laying down of the calcific material in the pulp tissue. He said that any filling material placed in a tooth which acted as an irritant of the right degree to the pulp would cause the deposit of calcific material. This fact had a direct bearing on the whole question of pulp-capping, and from our experience along this line he thought those cases where we cap the pulp with hope of ultimate success were growing fewer and fewer every day.

Dr. I. L. M. Waugh, Buffalo, thought that what Dr. Kirk had presented was not discussable, as Dr. Kirk had given the opinion of the writers and investigators along this line, and what he had stated were simply the facts as they were known today.

It would be conceded, he thought, that a knowledge of the minute structure of any tissue in health was essential to intelligent treatment in a disease condition. He regretted the fact, however, that many dentists did not consider this knowledge necessary and did not spend the time which should be spent in acquiring it, because they did not consider it of practical value in their work. He believed, however, that it could be used, and that this knowledge of the minute structure of the tissues was essential to intelligent treatment of the tissues in disease.

Dr. Kirk, he said, told how the calcific material was sent into the hard structure of the dentin and was thereby intensified. He wished to ask if the essayist knew that the pulp had the power of sending this mass of calcific material out into the dentin to intensify it, or whether this increase in the amount of calcific material did not cause the over-calcification of the dentin, producing what is known as the transparent zone of Tomes. We know that any stimulus which caused an excessive formation of tissue beyond the typal demand would cause a degeneration of that tissue, and applying our knowledge of the pulp and pericementum, he believed that any stimulus which would cause the pulp to form an excessive amount of calcific material

beyond the typal demand would cause the degeneration of that pulp.

The question of the vulnerability of the enamel was to him a very important one. The acids that promote decay rapidly invariably attack the cement substance between the enamel rods most readily. We know that the enamel prisms under high magnification do not present a homogeneous mass, but one made up of rods placed upon each other and pressed together so as to somewhat destroy the original shape of the rods, and the rods were held together by the cement substance. This cement substance is more vulnerable than the less responsive substance lying within the rods, therefore the line of penetration of the acids of decay is along the line of the cement substance—that is to say, the line of least resistance.

The question of destroying the pulps before placing crowns was a very important one. It seemed to him best to destroy the pulps when crowns were to be placed on the teeth, for the reason that you have a wall of dentin surrounded by a mass of metal and cement, both being greater conductors of thermal changes than the original covering—the enamel. Those in the practice of dentistry who have occasion to remove crowns from teeth found the dentin in a softened condition, and not affording the natural protection which the dentin and enamel should furnish to the pulp. All these agencies increased the stimulation of the pulp tissue and caused its degeneration.

In concluding, Dr. Waugh said he would like Dr. Kirk to answer the question whether this irritation tended to increase the calcification in the dentin, or whether the dentin was not increased in density, causing what is called the transparent zone of Tomes.

Dr. Kirk, in closing the discussion, said he was glad Dr. Waugh had asked that question, because it gave him an opportunity to say that he did not know. But if asked only for his opinion, he was inclined to take the position that it was an increase in density in the already formed dentin structure.

He agreed with Dr. Waugh in the belief that over-stimulation of the pulp beyond its normal physiological line of functioning would result in degeneration of the pulp. This applied, he said, to every other tissue of the body, and why not to the pulp? The point he would make would be that this laying down of an excessive amount of dentin may itself be a type of degeneration. In other words, did it not necessarily follow that this over-calcification was an expression of an abnormal function of the pulp and an evidence of degeneration?

With regard to Dr. Waugh's question as to whether the transparent zone of Tomes represented a less highly calcified condition of the dentin, or whether it represented over-calcification, he did not know. In fact there was no literature throwing positive light on the subject, as thus far the results obtained by the investigators of the subject were not conclusive. In the first place, the only tests thus far made upon this point were by chemical analyses of the transparent zone of Tomes, and also of the pulp-nodule, and thus far the results of chemical analyses did not throw definite light on the question of whether the proportion of calcific material in one was greater or less than in the other. The speaker said he had attempted to obtain further information on the subject by investigating sections of the transparent zone by means of polarized light, and from the light test he was inclined to believe it due to over-calcification. He did not feel quite sure of that, however, because when the dentin structure was altered in any way it transmitted light differently, so that the refraction test is at present open to certain sources of error, and he was not sure of its value in determining this point; his general feeling on the subject, however, was that the transparent zone of Tomes represented an over-calcification of the dentin.

(To be continued.)

NORTHEASTERN DENTAL ASSOCIATION.

Tenth Annual Convention.

WEDNESDAY—*Morning Session.*

THE tenth annual meeting of the Northeastern Dental Association was held on October 19, 20, and 21, 1904, in Unity Hall, Pratt st., Hartford, Conn.

The convention was called to order Wednesday, October 19th, at 11 A.M., with the president, Dr. Henry McManus, in the chair.

After the transaction of some routine business, motion was made and carried to adjourn until 2 P.M.

WEDNESDAY—*Afternoon Session.*

The afternoon session was called to order at 2 o'clock by the president, Dr. McManus.

Dr. E. O. Kinsman, secretary, was called upon to occupy the chair, and the president read his annual address.

The President, having resumed the chair, announced that the next order of business was the reading of a paper by Dr. A. W. HARLAN, New York, N. Y., on "The Surgery of Ulcerations of the Gums and Sockets of the Teeth," as follows:

THE SURGERY OF ULCERATIONS OF THE GUMS AND SOCKETS OF THE TEETH.

An ulcer on the gum in the human mouth, when not specific, may be due to a variety of causes. Those that we have to deal with are usually from traumatisms or local infections, and they may be located on any portion of the gum or roof of the mouth. Ulcerations of the mucous membrane of the soft palate, lips, or tongue will not be spoken of or considered here.

After a differential diagnosis is made, any removable cause of the irritation—a plate or other foreign body—should be sought for and remedied. The surface is then disinfected with 1:2000 bichlorid, as hot as can be borne, 130° to 150° F. The surface is dried with sterilized lint, gauze, or other suitable substance. It is then painted with the following: Cocain hydrochlorid 1 part, adrenalin chlorid 2 parts, sterilized water 47 parts. This should be made fresh every time it is used. Then with a suitable curette the surface of the ulcer is rigidly scraped so as to produce a gentle hemorrhage, which is not to be disturbed unless it be very excessive, when it is carefully wiped away. The parts are protected for a few minutes, and the surface is left with the adherent serum and blood to be washed away with the saliva. The patient is required to rinse his mouth with a hydronaphthol solution 1:1200, or a saturated boric acid solution, or a 1:100 sodium carbonate solution.

The slight control of hemorrhage by using the adrenalin chlorid, and the anesthetic action of the cocain, will be found quite useful and sufficient. If the disinfection has been complete, the ulcer will heal in a few days with no further treatment than the use of one or the other of the above washes at frequent intervals during the day. It is very essential that the curetted surface be not disturbed after the operation, as the tissues are then in the best condition for rapid healing. The use of local astringents and escharotics is not called for. In order to prevent the superficial coagulation of the ulcerated surface while disinfecting, it is always well to add three minims of acetic acid to every two ounces of the bichlorid solution. (The surface of an ulcer on the gum may be washed and disinfected with ten per cent. argyrol instead of the bichlorid solution.)

The ulcerations of the gum tissues spoken of in this paper are not those included under the general heading of aphthæ. You will find a classification of ulcers in Heath's "Dictionary of Surgery," and one also in the "Surgery by American Authors," edited by Roswell Park. Stephen Smith, Garretson, Cheyne, Bryant, Senn, and others have written upon ulcers in general, but not much concerning ulcers of the mouth. The days of the ulcer from general lack of hygiene of the mouth are slowly passing, in consequence of the increased activity and efficiency of the health officers in cities, towns, and villages. Injuries that deprive nature of her ability to repair through molecular death are still frequent enough to produce many ulcers in the mouth, and these, added to the cases of local infection by and through bacterial products, will give the surgeon much to do in mouth surgery many years from the present date.

It is a mistake to suppose that an ulcerated surface must be irrigated, and douched, and disturbed every few minutes with strong drugs. If we first of all cleanse, disinfect, anesthetize, and cauterize, we can cut and scrape the surface and have nature's own exudations coming to protect the new surface. How long would a dressing last in the mouth, even though the strongest cauterants and escharotics were used? I contend that we do not need to further destroy the surface of the ulcer. If such sores or ulcers were of constitutional or systemic origin it would be different, but the local breaking down of tissue from infection or injury, or both combined, will yield to the treatment I have indicated, if properly and rigidly performed.

It is believed by many that gout and rheumatism, or both, stand in a causal relation to the calcareous deposits on the roots of teeth, but such deposits in other portions of the body are always unaccompanied by the formation of pus, hence I conclude that this theory has only a slender thread to hang upon. Arthrodial deposits in themselves do not cause suppuration. The blood current carries the pus-forming organism to the point of irritation, and there we have the breaking down of the soft tissues with pus formation.

ULCERATION OF THE SOCKETS.

When we are confronted with a flow of pus from the socket of a tooth, and the tooth is still in place, we must first discover the cause of the outpouring of pus. If it be from syphilis, surgery will avail nothing. If due to an apical abscess the root of the tooth must be opened, disinfected, and filled, when the pus will cease flowing. The ulceration of the socket must come either from an injury causing tissue death or from infection. It does not matter in which form the tissues are injured, they will break down, and during the process of dissolution, or even at the beginning of it, small dark granular nodules and sheets of serumal calculus are deposited directly upon the denuded root. These keep up the irritation, and every day something is added to the concretions, and the inflammation is extended until the bony socket begins to melt down, and the tooth then becomes loose. The surgeon steps in at this moment and operates upon the roots of the teeth—first to remove all deposits, and secondly to operate upon the soft tissues. This, however, is not done until the socket is completely disinfected and cleansed. It may be necessary to anesthetize the socket before operating upon it.

If the soft tissues be gouged and scraped and cut sufficiently to rid them of adherent dead and dying portions, causing a flow of blood to relieve turgidity and carry away the effete white corpuscles, we have a condition which will promise a cure. Should any of the teeth be loose, they must be held with bands, bars, ligatures, or other secure means to permit of healing. After the operation of cutting and gouging is finished, and the sockets are cleansed and well sterilized, the weeping serum is not to be disturbed, or burned, or cauterized. Let it alone. Simply direct your patient to keep the mouth itself clean. This may be done with many substances—carbol-

ized water, chloroform or peppermint water, milk of magnesia, equal parts of zinc sulfate and lead acetate (40 grains to the ounce of water); potassium chlorid, boro-glycerin, 5 per cent. hydro- or beta-naphthol; saturated solution of borine or glyco-thymoline. If the surgical work be well done—and in order to succeed it must be well done—the case is cured. Such cases may be treated by the actinic ray or the violet light daily after a period of ten days have elapsed following the operation, but there will not be any improvement unless the surgical operation be performed first.

I feel particularly pleased to stand before you today pleading for the surgical treatment of ulcerations of the gums and sockets of the teeth, as Horace Wells of this city was the first to proclaim the benefits of anesthesia, and Dr. Riggs was the first to urge the surgical removal of deposits from the teeth as preliminary to the certain healing of the sockets. The importance of this operation to the patient cannot be too strongly impressed upon him, and the dental surgeon who operates with skill and judgment upon the sockets of two teeth at a sitting is doing as much, if not more, to preserve the teeth for use than the one who simply contents himself with filling a cavity or two, or inserting a crown or small bridge after the teeth are lost. I make the special plea that early in the history of ulceration of the soft tissues and the sockets of the teeth is the period to check it; and too much cannot be said of the efforts now being made to insure perfect cleanliness of the mouth and teeth.

Discussion.

Dr. G. A. Maxfield, Holyoke, Mass. I do not know of anything that troubles any of us as much as these diseases of the gums. In surface ulcers we have generally excellent success in treating after the method proposed by Dr. Harlan, but in cases involving the sockets of the teeth the treatment has been very discouraging. I think as we are becoming more particular with regard to removing all deposits on the teeth, and in polishing the surfaces we are having better success. After giving the teeth a thorough treatment I depend on the patient doing something for himself. In fact, I inform each patient that unless he is willing, and will be thorough in carrying out my instructions it is useless for me to attempt anything. In those patients who have thoroughly carried out instructions I have had excellent success, but in patients who have not done so my success has been very poor.

I had a young man come to me a year ago, sixteen years of age, who was a sufferer from an inflammatory disturbance around the necks of the teeth. From every tooth with the exception of one or two there was a flow of pus. After three treatments everything apparently looked as fine as could be. I instructed him as to what he had to do, and that I must see him again in five weeks. I did not see that patient again until about five weeks ago, and found the mouth in a worse condition than when I first saw it. I found a breaking down in the tooth-structure itself. Sixteen cavities had appeared since I had previously seen him. The teeth had a soft, disintegrated appearance, and it looked as though all the teeth were breaking down. Now, whether that has any connection with the conditions in the gums I cannot say, but the appearance of the mouth was certainly very discouraging to me.

Dr. Harlan. Replying to Dr. Maxfield, I should say that this was not a case of local infection or of injury, but that the patient had a general constitutional depravity, and had that been corrected the case would easily have taken care of itself. And while I am unable to say what particular treatment, or diet, or tonic, or air, or water this man should have, I should think he needed something in addition to the local treatment, which Dr. Maxfield did not particularize. If you have in the beginning at the margins or the surfaces of the gums pointing toward the cheek, a destruction of the tooth tissue equivalent to necrosis in bone, you must get rid of that. It must be scraped, curetted, cut, and disinfected,

because usually such a condition is either the expression of some physical condition or a local infection which continues causing the proliferation of the pus-producing organisms. If the man needs iron in his blood or some change in his diet, then give that to him.

I spoke more particularly in my paper of those forms that we call infection from injury. It does not matter how the injury comes, whether it be a blow, or whether by something that may have been done accidentally by the surgeon in doing another operation; infection may result from such an injury which will result in ulcers on the surfaces of the gums accompanied by the loss of considerable tissue, alveolar pyorrhea, and the loss of teeth. Sometimes it does not begin at the surfaces of the gums, but deeper. If you will pardon my digressing for a moment, I will mention that a dentist forced a small portion of an infected pulp through the enlarged end of the root of a tooth, which to my knowledge not only inflamed the tissues around the root very badly, but the patient came very near dying. He lost all of the alveolar process from the median line back to and surrounding the third molar. If a simple thing like that will cause such a destruction of tissue, is it not probable that many times we lose teeth from local infections not due to constitutional diseases at all?

Dr. A. C. Fones, Bridgeport, Conn. It has been estimated that sixty-five per cent. of the teeth are lost through this ulcerated condition of the sockets and other forms of pyorrhea alveolaris. The profession as a rule is saving the crowns of teeth, filling cavities, but paying little or no attention to the foundation of the tooth, which is the root; to my mind this is the most important portion of the tooth, together with its pericementum. One would not think of building a house on a sand-hill, and yet there are dentists doing extensive operations on the crowns of teeth, with pus exuding from pockets around the root.

I was in hope that Dr. Harlan would go into the subject a little deeper than he has, as I know he is capable of discussing it from all sides. It is such an interesting and important subject that I want to see it threshed out in our dental meetings, that we may have some intelligent idea about the treatment to be instituted, based on a reasonable theoretical understanding. Are constitutional conditions a factor in producing this disease, or is it entirely or nearly so due to local conditions? In this connection we have some clinical facts to consider. We see young people in anemic condition, nervous debility, yet rarely developing this disease, even with unsanitary mouths. Why? Is the pericementum so thick and vascular at this age, and its vitality so great, that it can withstand the irritating effects of the poisonous products of decomposing food at its borders? It would seem so. But after a person passes the age of thirty or thirty-five a change slowly takes place; this membrane gradually grows thinner. As it does so it becomes less vascular, and with a lessened vascularity its vitality and resistant power is lessened. Under these conditions constitutional disorders may lower its vitality still further, and render it susceptible at its borders to the toxins and ptomains generated by the decomposition and putrefaction of food débris, finally causing its death, with infection of the surrounding tissues. If a pocket be formed beside a root on one side of the jaw, we are almost sure to find its mate on the opposite side developing the same condition in a corresponding place. In dental caries we find the same thing, as teeth usually decay in pairs. Are products generated from food débris acting on susceptible tissue the cause of both? It does seem that the causes are principally local.

A young lady, aged eighteen, presented herself to me with a large deposit of tartar on the buccal surfaces of the upper molars. Gingivitis was present along the gum margin. For experiment the tartar was left on one tooth, thoroughly dried, and sterilized with carbolic acid. The patient was asked to place three or four times a day for half an hour a pledget of cotton saturated with a given antiseptic, over the deposit along the

gum. In forty-eight hours the gingivitis had disappeared. Now, the question is, is tartar in itself an irritating factor, or is it its porous quality of soaking up and holding food débris like a sponge that makes it an irritant? We know that when a porcelain inlay is placed under the margin of the gum, even though bulging at its center, we have no gingivitis, because the surface is smooth and dense, and the food has no foothold.

In the treatment of these cases I believe there are three things absolutely essential: thorough instrumentation, a high polishing of all the surfaces of all the teeth at frequent intervals with the orange-wood stick and pumice, and the systematic and rapid brushing of the teeth and gums by the patient. If you do not have the co-operation of the patient your efforts will be in vain. When Dr. Harlan says he cures this condition, I doubt if he means exactly that. He may control it for the time being, but there is almost sure to be a recurrence or slow progress of the disease unless the patient returns at fairly frequent intervals and submits to instrumentation and thorough polishing of the enamel surfaces, especially around the necks of the teeth. This rapid brushing on the part of the patient is very essential to success, as it imparts a vascular stimulus to the gums which is felt by the underlying tissues, increasing the vitality of the pericementum and restoring the tissues to health.

Dr. A. J. Flanagan, Springfield, Mass. Before I take up the discussion of the paper, I would like to ask one question, and that question is, Does Dr. Harlan include in his paper such cases as are ordinarily known as pyorrhea?

Dr. Harlan. I hope the gentlemen in discussing the paper will consider the title itself broad enough to give the audience all the latitude desirable for the discussion of any form of loosening of the teeth, or any condition where there is a pus formation in the pocket, or anything which has to do with the breaking down of the foundation of the teeth.

Dr. Flanagan. I have been attending dental meetings for some few years, and I have always maintained, and I maintain today, that there are two subjects which will always provoke no end of discussion; first, the capping of pulps, and second, pyorrhea. I ask all present if we have had any new ideas of any true scientific value promulgated today with regard to the cure of diseases of the gums, or of the diseased membranes around the teeth. I think that covers the paper. Now, gentlemen, we must come to the conclusion that it is about time to stop recommending certain procedures and certain mouth-washes as sure cures for so-called pyorrhea. Are we today any wiser than we were ten years ago as to the etiology of pyorrhea? I should like to have some person give us today some scientific cause for this disease. Now, it is a very easy matter to say that when the local treatment fails there is a systemic condition present—retrograde metamorphosis, faulty metabolism, or something else with a big name. Physicians often use these terms when they are puzzled, and we are not above borrowing them at times. I would ask each one why we use such terms. Why not come down to the truth and admit that we do not know; then we will have promulgated a truth and will have a new starting-point. I cannot agree with the essayist that his treatment is a sure cure for pyorrhea. Suppose a case with one-half of the membrane of the root of the tooth gone, and the tooth stands there one-half out of that membrane. We remove all the deposits as thoroughly as we can, and we prescribe certain mouth-washes, etc. Now, it has been my experience that we have pockets remaining under that gum, and in order to get rid of these pockets we have to cut down one-half of the membrane, otherwise we have not performed scientific surgery, but have left the pocket there. I am sorry to say that the greatest trouble in dentistry is that we are not looking for the truth. We must come down to some reasons for these things. We certainly cannot effect a cure until we find the cause. Unless we find the cause we cannot remove it. I maintain that the whole question of the treatment of pyorrhea should be eliminated from our

dental societies at large until we get down to a true scientific basis. We call ourselves a scientific body, but men of thought and worth question this claim.

Dr. A. C. Fones. I agree with Dr. Flanagan that we should know the true science of this disease, and then treat according to the theory as discovered; but if we are getting practical results in a system of treatment we must then make our theory fit our practice. There are a number of men—and a large number I imagine, but small in comparison to the thirty-five thousand dentists practicing in the United States—who are getting satisfactory results in the treatment of this disease. If such be the case, we should necessarily come to a theory and system of treatment on which to establish general practice. This subject I believe to be an exceedingly important one, and to eliminate all discussion of it at our meetings would be a great mistake. One more point: Dr. Flanagan in speaking of pockets says that the nearer we come to eliminating them the more firm the teeth will remain. Where we have extensive absorption there can be no attachment between the gum and the pericementum.

Dr. Flanagan. If Dr. Fones understood me to say that there could be an attachment there after a pocket is once formed, he misunderstood me.

Dr. Fones. I understood that you said there should be no pocket there. When there is extensive absorption, I believe a pocket always remains.

Dr. W. H. Rider, Danbury, Conn. I agree very largely with Dr. Flanagan in his conclusions that we have listened to no end of discussion on this subject, and many have gone away from meetings thinking that they had a sure cure for all cases of this kind, only to find that in their actual practice all cases do not belong to the same family and that they have failed to recognize and take into consideration the idiosyncrasy of each particular patient. We often find in patients from the same family different idiosyncrasies which we cannot afford to disregard.

Men have come before us time and again presenting one aspect of the disease and advocating certain treatment as a sure cure for all cases, but when we have come to apply it in our practice we often find that it is of no special importance in the general treatment of the disease, and that in many cases it is contra-indicated. We have learned much of, and made great advances in the general treatment of the disease, but are still far from being capable of arriving at a correct diagnosis in all cases, our prognosis often being faulty, and our treatment of little avail.

My remarks are to be considered as prompted by Dr. Flanagan's, rather than as a criticism of the paper.

Dr. Flanagan. Medical history has taught us that many great truths have come from observations in hospitals, asylums, etc. There, trained minds have been able to follow courses of investigation and treatment because the patients were under their direct charge long enough to accomplish something. The success attending such investigations brings to mind the thought that dentistry could follow a like course in solving our unknown problems. It seems to me that it is opportune for dental practitioners connected with institutions to examine the saliva, the blood, the urine, the temperature, and many other conditions of patients suffering from this dread disease. Could any society do greater good than to appropriate money for such investigations? If such a plan be possible, and you wish to start it, you can count on me for financial aid.

Dr. C. F. Bliven, Worcester, Mass. I would like to indorse the remarks of Dr. Flanagan. When the subject was first brought before the profession I was calling upon a young dentist in one of the large cities; while there he asked me to look at a case in his chair. Entering the operating room I found a lady seated in the chair. After examining her mouth, in which I saw only a few cavities and slight calcareous deposits, and seeing nothing out of the ordinary, I asked the dentist what he wished to know. "Why," he replied, "I wish to know how to deal with this case." I

answered that I found only a little filling to be done, the calculus removed, and teeth polished, to put this mouth in a thoroughly sanitary condition. He then said that this lady was fearful of losing the lower central incisor. She had gone to a leading specialist for the treatment of "Riggs' disease." She was induced to believe that she would lose the tooth unless it were treated once or twice a week. She had made thirty visits, at a dollar a visit, and was discouraged because it showed no improvement, and she was much worried over the expected loss of the tooth.

During our conversation another specialist came in. He looked at the mouth, and offered to put it in sanitary condition for seventy-five dollars. While the dentist and the specialist were consulting in the next room, I took the opportunity to save this woman from such a humbug. I told her that her mouth could be put in perfect sanitary condition for ten or twelve dollars, and not to allow herself to be persuaded to pay any such exorbitant sum. I told her if she doubted my statement, I would perform the operation for the quoted sum if she would come to Worcester.

Gentlemen, the whole trouble was the result of an accumulation of black tartar. Its removal was all that was necessary. The first specialist developed for mercenary ends this fear of losing her teeth, and the second specialist took advantage of her condition. Ten dollars would have satisfied most men for the operation—that is, if they were not desirous of becoming a Rockefeller in a short time. So long as men of this character have opportunity to come before our meetings and discuss this topic, just so long will no progress be made toward the correction of these conditions.

Dr. C. W. Strang, Bridgeport, Conn. I am very much interested in this subject, and I want to say in the beginning what I have often said before, that if I am not practical I am nothing. I sometimes see things, and hear of others, that surprise me, and while at the Asbury Park meeting, last July, Dr. Luckey of Paterson, N. J., spoke of a case that came in his own practice, that of one of his old patients, who was at the time living in the city of Washington. I do not know how long she had been away from him, but I would judge from what Dr. Luckey said that he had seen the case within a year and performed all necessary operations; but apparently without much warning she found her gums, particularly about the lower incisors, in a deplorable condition. She became alarmed and telegraphed Dr. Luckey that she would have to see him without delay; and, as I understood it, without further delay in the case she went to his home in Paterson. The doctor said he found the lower incisors in a very bad condition, the gums inflamed, the incisors very loose, and there had been such a marked change in the condition of her mouth in such a short time that it was really appalling. The doctor began treatment, which consisted of the cleansing of the teeth, finding a great deal of deposit upon them, which he proceeded to remove, and administered treatment to the inflamed gums, the result being that he obtained very satisfactory and ready improvement in the case.

In April last I cleansed the teeth of one of my patients, a young man—I should say thirty years of age. I had had charge of his teeth ever since he was a small boy, and the teeth were of excellent material and the mouth generally remained in a very healthy condition with but little filling to be done. There are fillings in only four or five teeth, and those mostly in fissures of molars. I treated the case in April last the best I knew how, which was the method *à la* Smith, polishing with orange-wood points in the handles. The mouth was in a very healthy condition. In the latter part of July or the early part of August, when I had made my arrangements to go away for my vacation, I had a telephone message from this young man that his gums were in a bad condition. When I had an hour at my disposal that I could give to the case I had him come to the office, and I want to assure you, gentlemen, that if I had not seen his mouth in April, and

cleansed the teeth as thoroughly as possible and left the mouth in a healthy condition, and known the condition it was in at that time, I would have said that his teeth had not been cleaned in five years. About the lower incisors the gums had receded. There was no discharge of pus from any socket, but there was a discharge of mucus, a slimy discharge of a light color constantly oozing from around these teeth. The gum around the lower molars, and particularly on the left, was raised over the tooth, and in such an inflamed condition that when I touched the gum there was a severe hemorrhage. About the lower right bicuspids and right canines were great pockets. The gums were in a deplorably irritated condition. I asked the patient what on earth had done all this. He said his doctor had had him under treatment for throat trouble, and he had been dosing his gums with listerine. "Well," I said, "it does seem to me as though something was poisoning you." I asked him in what strength he had been using the listerine, and he said, full strength. I told him to stop it, and I went to work on the case, cleansed the teeth very thoroughly, removing the deposits, which were not very hard but which, however, required force to dislodge them. The gums were then thoroughly washed with warm water, every pocket syringed out, and the teeth were polished. I syringed them thoroughly time and time again, so as to remove everything of a foreign nature that could possibly be there. And when he left the office I gave him a bottle of pyrozone and a pyrozone syringe, and told him to get a bottle of phénol sodique, which was to be used five or six times a day as a mouth-wash, diluted about one-half, and to syringe the gums with it. I instructed him to use the pyrozone in connection with the phénol sodique, and report to me in a week. I also instructed him to use the tooth-brush, brushing the teeth in every conceivable way, about, above, across, beside, below, everywhere, only to be thorough, and said he could not do that unless he spent five minutes at a time in brushing them. He returned to me in a week with a very marked improvement. I examined the mouth again and found deposits at the necks of the teeth—not so much as before, but some. I gave the same treatment, and advised him to continue the use of pyrozone and phénol sodique. Ten days later I saw a very marked improvement; I then repeated the polishing. In another ten days I saw him again and found an almost perfect condition of health. The gums had returned to a healthy condition, and the natural lines were again showing themselves, but there had been a loss of a great deal of the alveolar process in certain places. I would hardly have thought that such a change could take place in so short a space of time. Now, what did it? I do not know. The young man's health was uniformly good, and I could not account for it in any way. I only suspect that there might have been irritation from the listerine. He had used it on the principle that if there was virtue in using a little, there would be great benefit in using great quantities, and I suspect that the listerine had begun to act as an irritant, practically parboiling the tissues.

Another case of the same character came under my observation a few years ago, that of a lady whose teeth I had been over very thoroughly several months previously, and now in examining the mouth I saw places in a parboiled condition. The general health of the patient was good, the teeth were clean, no signs of tartar, and I asked her what she was doing to produce this condition. She told me she had been using listerine. I advised her to stop it. She said she had been using it so long and had become so accustomed to it that she would feel lost without it. But I insisted and she discontinued the use of it, and at the end of several months her gums were in a normally healthy state, as they are at the present time.

I want to emphasize what some of my friends have said here today, that unless you get the full co-operation of your patient in the treatment of these conditions, your time is practically thrown away. But if we can get our patients

to brush, brush thoroughly, not with the sawing-across-the-teeth motion—that is a wicked way of brushing the teeth—but in the proper way, with which we are all familiar, and if we can get them to spend five minutes in brushing the teeth every morning and five minutes every night the last thing before retiring, our efforts to keep the mouth in a healthy condition will largely count.

Dr. Civilion Fones, Bridgeport, Conn. I have been interested in this disease ever since I met Dr. Riggs. I want to ask if I understood Dr. Flanagan to say that when a patient presents himself to him and asks about the disease, he says he does not know.

Dr. Flanagan. I say I do not know in a scientific sense. I know perhaps as much as the average practical man, but not from a scientific standpoint.

Dr. Fones. Will you please explain what you mean by a scientific sense?

Dr. Flanagan. That we do not know at present the scientific cause of pyorrhea.

Dr. Fones. We know how to treat it, and something of the causes which produce it, and it is only by discussions like these and by investigation that we will be able to find the conditions that make this disease possible. I am glad to hear the question discussed, and I was quite interested in the paper of Dr. Harlan. For many years I followed Dr. Riggs' treatment with varied success, but now I am treating in another direction, and have had quite satisfactory results. Just one point I want to speak of in connection with this disease, and that is that seldom has a case of pyorrhea come into my hands but that the patient had had a letting down of the nerve centers. There had been worry, excess, overwork, or something of the kind to cause a great strain upon the nerve centers, accompanied by poor circulation. In nearly every case I have found these conditions, and I have come to the conclusion that a great many of these cases are due to an exceedingly weakened nervous condition. I think it is reasonable that it should be so—that it should come from that condition. The teeth have a limited vitality, and in that portion of the body the circulation is very intricate, and if the circulation be imperfect the teeth and surrounding tissues do not get the nourishment necessary, and of course the parts suffer from it. That is all I want to say in regard to that. I have had in these many years a great number of cases of this kind in lawyers, doctors, and other professional men, and in every case I recommend a let-up on business and advise more outdoor exercise. In one case particularly I recommended the riding of a bicycle. The man was very much confined to his business and run down, and he claims today that the bicycle saved his teeth and greatly improved his health, and I think he is pretty nearly correct. That is only one example; I could mention many more. I will not take a case under any consideration unless I have the thorough co-operation of the patient. I recommend brushing, of course, but I also recommend rubbing the teeth with cloth, also the use of waxed silk. By my present method of treatment, and with the co-operation of the patient, I am not afraid to deal with almost any case, feeling pretty well satisfied that I will restore the mouth to a state of health.

Dr. N. J. Goodwin, Hartford, Conn. If the thorough removal of all the irritating substances which we find about the necks of the teeth and under the gums, and keeping these away by seeing the patient frequently and keeping the surfaces of the roots and necks in a thoroughly clean condition—if this sort of treatment brings about a perfectly normal condition and restores the parts to health, as we know it does, then I claim that we have found the cause, viz., the irritating substances which we remove.

Dr. Maxfield. I want to say a word of warning in regard to mouth-washes. I believe that a good mouth-wash is essential in the treatment of pyorrhea. Formalin, for instance, is one of the most irritating agents we have; I have seen a great deal of inflammation of the gums as a result of using it. I do not believe in recommending mouth-washes without knowing what they are composed of. I

think that hydrogen dioxid is a good wash to use, but in some mouths it acts as an irritant. This we can control by using an equal quantity of milk of magnesia with it; this makes a very pleasant and beneficial mouth-wash. I do not believe anything is as healing as those washes that have carbolic acid in them, and mouth-washes containing carbolic acid are the best we have. Phénol sodique contains carbolic acid, and for that reason is a good mouth-wash. Personally, I prefer to myself make the mouth-wash that I give to my patients; I know then what I am giving them. In some of these cases of pyorrhea, I believe, not all the irritation comes simply from the deposits on the teeth; I think there is some constitutional irritation, some depletion of the system, that plays an important part in this disease. But, in many cases, I know that after thoroughly removing the deposits and polishing the teeth, and with the full co-operation of the patient, we do have good success. One thing more I would like to refer to, and that is the value of a compressed-air apparatus for thoroughly spraying the teeth and gums in the treatment of pyorrhea. I think we can place the mouth in as good antiseptic condition by spraying a weak solution of carbolic acid about the teeth and gums as by using the bichlorid solution recommended by the essayist. I think it an excellent method in the treatment of these cases, after the scraping and polishing, to thoroughly spray the gums and teeth. It gives the mouth a nice clean feeling, and counteracts any irritation from the work you have done.

Dr. L. C. Taylor, Hartford, Conn. I did not hear all that was said on the subject of the care of the mouth, and what little I may say will be upon the remarks of Drs. Strang and Maxfield. In relation to dental medicines, there are one or two points to which I would like to refer. A few days ago I had a letter from my friend Dr. Brackett, in which he spoke of the benefits of using hydrogen dioxid for the polishing of the teeth, and he said that if I had not used it, a new joy awaited me. I wrote him that ten years ago I had used it quite extensively, but the experience of years showed that while the surfaces of teeth were cleaned easily at the time, when the patient returned thirty days afterward the surfaces of these teeth were not polished, but looked as though the agent had roughened them. The mouth was not in as clean and healthy a condition as it was when phénol sodique was used. Using the latter constantly, you will find that your patient will come back thirty days later with the mouth in a very much better condition than it is possible to obtain by using any of the common remedies so much advocated.

Dr. Strang referred to one point on the treatment in pyorrheal conditions. Many years ago, some of the older members will remember, Dr. Atkinson used to tell us that he could get pretty good results from the syringing out of these pockets with aromatic sulfuric acid. Within the past few years these words have dwelt in my ears until I commenced to experiment with it. I had a case of a lateral incisor with very deep pockets, and I tried the best I knew to treat it, but with only partial success until I resorted to aromatic sulfuric acid, which dissolved the tartar from the pockets and restored the health of the gum. Aromatic sulfuric acid is practically non-caustic. A very peculiar feature of aromatic sulfuric acid is that it will not irritate or affect the live tissues other than to make a little sting or burn, which is very slight. Now, this may be a new point, but in following these cases I think Dr. Strang will be pleased if he will use this compound vigorously in these pockets after he has done the best he can to remove all foreign substances.

Dr. Harlan (closing the discussion). It seems to me that the medical profession has only within the past ten years been able to discover the cause of diphtheria, and at the present time there are quite a number of diseases that the general practitioner treats whereof he does not know even as much as we know about the causes of the loosening of the teeth. Therefore I should think that it would be useful to the members of the profes-

sion and to the public to still continue to discuss this question. I would like to call attention to the fact that in my paper I simply referred to the surgical treatment of ulcerations of the gums, and to the ulcerations of the sockets of the teeth. I did not attempt to read a paper on the causes of the loosening of teeth, because I stated emphatically, and I restate it, that nearly all of these cases are due to local infections and injuries, and that cases due to systemic causes are smaller in number.

Last night I listened to a very interesting paper by Dr. Peck of New York, on the relation of rheumatism and gout to dental diseases, and the essayist said that almost all of the erosions of the teeth were due to rheumatism or gout, and then went on to state that nearly all of the calcareous deposits in different portions of the eye were due to gout, and by analogy all concretions found on the roots of the teeth were in people suffering from gout. I pointed out in a few remarks the dissimilarity between the deposits of calcareous matter in the eye and on the roots of the teeth, because in nearly all of these cases, except those which are due to a specific well-known cause, which is easily recognized, the deposits of calcareous matter, no matter whether serumal or any other name you choose to call them, are accompanied by suppuration, and in the tissues of the eye we do not have suppuration, showing that one is caused by too much calcareous matter in the system. In deposits on the roots of the teeth we nearly always have accompanying them filth, ptomains, poisons, and substances analogous thereto, due to decomposition. Now in all cases of so-called pyorrhea alveolaris—and I do not accept that general term any more than do other members of the profession, but it expresses something—we nearly always have pus. Now, is there any gentleman in this room who is able at the present day to demonstrate that we have pus without micro-organisms? I am not aware that anything has been projected in the last few years to prove conclusively that you can have pus without micro-organisms. How does the micro-organism get into the region of the gingival margin? Does it get there through the circulation, because a man has rheumatism or gout, or because he takes blue mass or some other substance which causes ptyalism, or is it because he has an injury, and that injury becomes the point of the beginning of the suppurative process at the margin of the gum, together with all of the sequelæ? What follows the destruction of the alveolar process? The destruction of the pericementum, the loosening of the teeth, the exposure of the pulp-apex of these teeth, and extraction.

The case mentioned by Dr. Strang, it seems to me, was a clear case of local infection which he was unable to discover. He did not say that the patient had renal affection or any trouble with his stomach or other parts of the alimentary tract, and it appears to me that this local infection may have been accelerated by the injudicious use of listerine, and this is proved by the fact that the man got well without sending him to some springs, or without feeding him on Vichy water or some other water, but by cleanliness and the use of the simple remedies with which we are all familiar.

I have no disposition or wish to tire this audience, but I wish to say something about hydrogen dioxid. I had the honor of preparing the first paper read in the United States on hydrogen dioxid in 1881, and in 1882 I read a paper on the uses of hydrogen dioxid in dental surgery before the American Dental Association. I wish to say that a great many cases of necrosis of the thin margins of the alveolar process are brought about by its injudicious use. I do not recommend it to my patients, for the reason that many preparations have to be preserved at all temperatures above 60° with acids, and its injudicious use will result in a great deal of destruction. If you take a tincture of iron chlorid and dilute until you have one-fourth or one-half of one per cent., and wash the teeth with that once a day, you will find that it is destructive.

When Dr. Taylor spoke of using sub-

stances composed of carbolic acid and recommended the use of phénol sodique, I was reminded of the time when Dr. J. W. White called me to his room and showed me the composition of phénol sodique, and I did not then, nor do I now, think that it would be injurious, if diluted properly, to the surfaces of the teeth. Only when used strong and brought into contact with the necks of the teeth and the thin margins of enamel, do we find that damage comes to the teeth. And this is due to the fact that after many of these preparations are diluted they contain still enough acid to attack substances containing so much inorganic matter as the tooth, and that is why we have trouble.

In reply to Dr. Flanagan, I think we should continue the discussion of this question. I would like to have Dr. Flanagan know what I undertake to do in the treatment of cases of this kind. When the patient sits down in the chair I try to find out what his habits have been, by questioning and by observation; then I test the secretions of his mouth, and if I find him suffering from some concomitant constitutional systemic malady, I try to cure that. It is not always necessary to examine the blood of every individual, although I grant that it is a good plan; but there are plenty of men in the United States quite capable of examining the blood of the patient to discover the conditions of the system. One of the many physicians of New York said to me a little while ago that what America seemed to be suffering from is too much albumin. Recently at the New York Odontological Society one gentleman said that the great trouble of the American people was that they were eating too much animal food. Now, with reference to the system of treatment of this disease, until you get it fixed in your minds that all of the cases of loosening of the teeth are not due to one single cause, you are not able to say that one particular treatment you lay down is a sure cure.

One of the gentlemen in discussing the paper said that he did not believe that washes were particularly beneficial. I do not either; I do not recommend them. I simply said that if you had performed a definite operation on the roots of teeth, and had previously disinfected them and got rid of all the dead material, then, after allaying the weeping of the serum, stop there, and do not go on with carbolic acid, creasote, zinc chlorid, lactic acid, or anything else, because you have already done the cleaning. I quite agree that the teeth should be brushed and the mouth cleansed. I also agree that a man should keep the pores of his skin open by riding a bicycle or doing anything that will help, but I beg to demur when the gentleman says that I am promulgating the idea that I could present a system of treatment that would cure all cases. I did not attempt to give the cause of the loosening of the teeth, but my paper was for the specific purpose of showing how to treat ulcerations of the gums from infections or injuries. I wish to say that if a good many of the dentists who are treating these cases would pay more attention to cleansing *around* the roots of the teeth and the festoons of the gums, and keep them clean, they would have very much better results.

On motion the subject was passed, and the next order of business as announced by the president was the reading of a paper on "The Use of Formalin for Hardening the Dental Pulp," by Dr. JOHN I. HART, New York, N. Y.

[Dr. Hart's paper is printed in full at page 563 of the present issue of the COSMOS.]

Discussion.

Dr. R. M. CHASE, Bethel, Vt. I am sure that if this method is all that Dr. Hart has claimed for it, we have something very valuable. We find many cases where it is almost impossible to extract the pulp, and if formalin will act on it so as to allow it to remain without giving trouble—and I do not doubt that it will, from Dr. Hart's description—I am sure that we have a very valuable suggestion. I have not tried it myself, but I must admit that it looks feasible.

Dr. E. S. Rosenbluth, Bridgeport, Conn. I have listened with considerable interest to the paper of Dr. Hart, and feel confident that his procedure will meet with success in most cases. However, teeth are often found in which formalin, whether in watery solution, or better, when combined with phénol, creasote, or tricresol, which limit its irritating qualities to a marked degree, will nevertheless cause a pericementitis which is difficult to subdue. The comfort of removing a devitalized pulp *en masse* is much to be desired, but are we justified in taking the risk of setting up irritation to accomplish this result?

Dr. A. J. Flanagan, Springfield, Mass. The only experience that I have had with formalin has been in the treatment of root-canals with the preparation brought before the profession some years ago, but I discontinued the use of it because of the irritating results. I have had no experience with hardening tissue, except as I have come in contact with undertakers. The preparation they now use is composed principally of formalin. Previous to the introduction of formalin they used arsenate of soda, but at the present time we find all successful embalming fluids containing a certain percentage of formalin.

I would like to ask Dr. Hart a few questions. He says that he applies arsenic for about forty-eight hours, and then proceeds to use the formalin to harden the pulp tissue. Many practitioners leave arsenic in a tooth for a much longer period. Would the formalin act as well under such conditions? How is the formalin applied in multi-rooted teeth? Is it applied by cotton, broach, or hypodermic? Last, but not by any means least, has Dr. Hart ever had pericemental irritation following the use of a five or ten per cent. solution?

Dr. Hart. In answer to the question as to the irritating influence of formalin at the apical end of the tooth, I will say that formalin applied against the pulp stump does not act in that way any more than does carbolic acid, in that it coagulates the albumin and will not penetrate as far as the end of the root for several days. The method of application is to saturate a piece of cotton or spunk with a five per cent. solution of formalin; having removed the bulbous portion of the pulp, place over that saturated cotton a Teague disk, which is a thin tin disk lined with asbestos, so that when the temporary stopping or cement is placed over the formalin on the cotton it will penetrate toward the pulp. I have not used a ten per cent. solution, but have adhered to the five per cent. solution. When the bulbous portion of multi-rooted tooth-pulp is removed, care is exercised that the cotton saturated is sufficiently large to cover all three of the stumps. I remove the bulbous portion of the pulp so as to accelerate the action of the formalin as much as possible, and do away with the necessity of coagulating or hardening all of the bulbous portion.

Dr. Flanagan. How long is the dressing allowed to remain?

Dr. Hart. I find three days ample time for the best effects.

Dr. Flanagan. We all know the tendency of the pulp tissue to coagulate and harden to a certain extent when arsenic is allowed to remain in contact with it for ten days, and I would like to know if, in cases where the arsenic is allowed to remain ten days, we would not get a better effect from the formalin than in cases where the arsenic is allowed to remain only from twenty-four to forty-eight hours.

Dr. Hart. I cannot answer that question. I have not followed the practice of allowing arsenic to remain in contact with an exposed pulp for more than twenty-four to forty-eight hours, for the reason that it is so liable to set up pericemental irritation if left longer. Frequently, however, in these cases we find that the pulp has not been completely devitalized, but realizing that sufficient arsenic has been absorbed to finally destroy the entire pulp, then the use of the formalin for three days results in complete devitalization and hardening of the pulp.

I would call attention to the fact that I said the arsenic is placed in contact

with the exposed pulp. I would not expect the action of the arsenic to be so good when placed in contact with the dentin, that acting as a screen between the arsenic and the pulp.

Dr. Maxfield. Does Dr. Hart use formalin after using pressure anesthesia in a multi-rooted tooth?

Dr. Hart. No, sir; you are too likely to have irritation there. I do not think that we should gain anything, because such anesthetic effect lasts only a short time, and then, if formalin be placed on such a pulp it might penetrate sufficiently to cause a superficial coagulation, and you would have a very painful pulp to remove. I have only made use of the formalin when the pulp is devitalized with arsenic.

Dr. A. C. Fones. What advantage has this method over the injection of cocain and adrenalin? Not with the hypodermic needle, but under gutta-percha, which enables us to remove many of these pulps painlessly. I would like to know if Dr. Hart uses this method universally, or only resorts to it in special cases.

Dr. Hart. I stated in my paper that this was merely a method I resorted to when I employed arsenic. I believe that there is a place for adrenalin and cocain, as it was my privilege to demonstrate in a clinic a short while ago that pulps can be removed quickly and painlessly with pressure anesthesia, and I make use of it in my practice. But I stated that there was sometimes a hemorrhage which is very difficult to control in cases of pulp-removal under this method, and that difficulty sometimes may result in leaving a particle of the pulp tissue; or possibly there was a piece of adherent tissue at the apex of the tooth which was not in the condition I desired, and thus I have not been able to resort to immediate root-filling, causing a delay in the filling, and not resulting in the saving of time which we look for in pressure anesthesia, and which I admit we sometimes obtain.

Dr. D. Genese, Baltimore, Md. From my experience with formalin I should judge that the percentage used in the teeth as advised by the essayist is rather strong. I think you will find a proportion of 2 oz. in 126 oz. water (1.59 per cent.), and this again reduced, is ample to cause irritation to the tissues. Therefore, I should say that a solution of still less strength than the doctor advises would be better in cases where there is any danger of its escaping around the tooth. Regarding the question of pulp-removal, I have done a lot of work on removing exposed pulps, and my method is, after the pulp is exposed, to apply cocain or carbolic acid and cocain, and then, with a fine bur in the dental engine, and putting the highest speed on the engine, I have been able to remove these pulps without the patient feeling it at all.

Dr. A. W. Harlan, New York. In all the methods of hardening or digesting pulps it is absolutely essential that they should be dead, because, if one-half of the pulp is in a root still alive you may find that the hardening by the formalin is not completely successful; and Dr. Hart has anticipated that possible criticism by saying that he always places the arsenic directly on the pulp, and when this is done, unless there is a deposit of some kind in the pulp, it will be dead in twenty-four hours. Recently I had an experience in trying to destroy the pulp of a tooth, in which the arsenic was kept in contact with the pulp after exposure between seven and nine days before it was completely devitalized. Embedded between the pulp-chamber and the apex of the root I found a calcification, and as soon as that was removed the arsenic destroyed the remainder. In cases where there is not much access for the arsenic it may be necessary to keep the arsenic in the root for a longer period.

I do not see any objection to the use of formalin as advocated by the essayist, because Dr. Hart pointed out that when the bulbous portion of the pulp was removed he applied to the surface a five per cent. solution of formalin, which is 40 per cent. of formaldehyd in water, and when this is applied and covered with a piece of paper fiber or a thin piece of

asbestos you have the best possible conditions for hardening the pulp in minute tortuous canals. If it so reduces the size of the pulp that you are able to take a pair of pliers and remove it, then this is a very excellent thing. But when we fail with that, you must remember that you can digest any pulp with papain if given sufficient time. I was talking with a member of the firm of Johnson & Johnson, the manufacturers of this preparation, and he said that every specimen that went out of the factory was tested with reference to its power to digest tissue, and he found, as pointed out in a paper by myself read in Paris in 1900, that if the pulp is first washed with an alkaline solution of borate of soda, the formula of which I gave at that time, you could be absolutely certain that the pulp would disintegrate, provided it was given a sufficient time. It will not do it as soon as Dr. Hart has pointed out that he could harden the pulp with formalin, and therefore I should think from the standpoint of economy of time, in those cases where it is possible by an external examination to determine that the roots are not curved and crooked, that this is a very excellent method.

Dr. Hart (closing the discussion). It was with no object of claiming that this method was more advantageous or a better process than the removal of pulps under pressure anesthesia that I presented this method or process to you. It was merely that when you devitalize pulps with arsenic, and particularly pulps of the molars, that present difficulty in removing—for example, the two buccal stumps, or in the lower molar the two anterior stumps—then this method helps in the process of removal. There are times when it becomes necessary to devitalize when possibly we cannot give the time to removing under pressure anesthesia, or for some reason it may not be advantageous to do so, and you desire to resort to the use of arsenic; and having done that, I think it is an advantage to harden the pulp.

On motion the subject of Dr. Hart's paper was passed, and the meeting adjourned until 8 o'clock Wednesday evening.

MARYLAND STATE DENTAL ASSOCIATION.

Quarterly Clinic, June 25, 1904.

The quarterly clinic of the Maryland State Dental Association was held in the Dental Department of the Baltimore Medical College, Baltimore, June 25, 1904.

Saturday afternoon was devoted to the clinics given below, and in the evening a business session of the society was held, after which there followed a discussion of the afternoon's clinics.

Clinics.

Dr. Clarence J. Grieves—"An Upper First Bicuspid Porcelain-face Crown." The buccal wall and cusp are removed and the cervico-buccal margin trimmed under the gum as for a Richmond crown. The lingual wall is straightened and the cusp removed by grinding in a direct slant to the beveled cervico-buccal margin. The approximal walls are paralleled to the cervical circumference, and the pulp-chamber is enlarged to the depth of the bifurcation, to receive a heavy post. The pulp-canals proper are sealed permanently.

To this beveled conical stump is fitted cervically a No. 30-gage 22-k. band, cut to flare somewhat. The walls are pressed against the approximating surfaces of the adjoining teeth, assuring interproxi-

mal contour. After trimming, this band is topped by a thin coping which receives in its center a heavy flattened post extending into the pulp-chamber to the bifurcation. On an articulating cast a porcelain facing is ground to position, backed with an extended backing, set up in wax and boxed cervically with a crescent of 1/1000 platinum foil. In soldering, with 20 or 22-k. solders, after union of the backing and coping, a fused ball of 22-k. scrap is placed on the palatal portion of the coping, and on engaging with the solder it forms the palatal cusp. A little excess of solder and careful grinding at the chair save the necessity of carving and swaging the cusp. The use of the swaged cusp is next to impossible owing to the high palatal wall. Occasionally the saddle-back tooth can be used; in that case the results are effective, but frail.

Occlusal force in the upper bicuspid region, while exerted lingually, buccally, and vertically (the direction of the long axis of the tooth), is greatest in the buccal and vertical directions. This crown presents to the vertical stress a larger contact surface, even though it be inclined, than the stump in the all-metal shell crown, or the root-face in the Richmond. It is, in the clinician's estimation, the strongest porcelain-face crown known, meeting the buccal stress by the resistance offered by the entire lingual wall and heavy post.

The all-metal shell, its unsightly appearance, the only too frequent pulp symptoms when it is placed on live teeth, are all powerful arguments in favor of porcelain fronts, with partial excision of the stump, and the clean root-surgery on which all must depend.

Definite interproximate and cervical contour, a short heavy pin, and ease of adaptation as a bridge pier as compared with the double-pin Richmond, are only a few of its many advantages.

Dr. G. Marshall Smith—"Repairing Badly Fractured Teeth, Using Band and Screw." To restore badly fractured teeth where the fracture includes the whole or a large part of the root, wash out the débris with warm water, bring the parts together with several wrappings of well-waxed silk floss tied around the tooth just above the gum line. This will hold them firmly together, allowing a separating disk to pass between this tooth and the adjoining ones, if this be necessary. With a thin copper strip the measurement of its greatest diameter is taken, and from this a band of German silver about No. 35 gage is made. The band is placed in position with or without cement. If the tooth be pulpless and the canals have been filled, a large part of the center of the tooth is cut out, exposing well the openings of all the canals, and removing the fillings from these for about an eighth or three-sixteenths of an inch.

Now comes the use of the instruments originally designed, I believe, for setting the How crown, and which have been so useful to me in many cases. There are three sizes of drills, all numbered. Select one of these that will not quite enter into the canals, and after enlarging the opening with this, cut the thread in the canals with the tap corresponding in number to the drill used. The white metal screw-post of the same number also is now tried, marking it at the point at which it is to be cut off.

The tooth may now be filled with amalgam. Be careful to pack it well around the screws. After the amalgam sets, the German silver band may be removed, and the tooth crowned or not, as may be desired.

The first case treated by the clinician in this way, sixteen years ago, was an upper first bicuspid. The roots were well separated, the fracture having occurred some time before the patient presented herself at his office. The parts were gradually brought together and treated as described above. The tooth is still doing good service.

Dr. E. E. Cruzen—"A Method of Attaching New Facings in Bridge Repair." The demonstration of attaching new facings in bridge repair was an improvement in the method shown by Dr. Cruzen last year. A backing of platinum,

No. 35 gage, is cut to the size of the facing to be replaced. Two holes are punched with pointed instruments to correspond with the position of the pins on the bridge. The pins of the broken facings are not removed. (Fig. 1.) The heads of the pins on the bridge are obliterated by pinching with a pair of pliers. A piece of tubing, to telescope over the pins, is cut just the length of each pin, one end being closed by soldering. These tubes are slipped one over each pin and the backing is put in place and burnished to the bridge. The jagged edges of the holes made by pushing the instrument through the backing are worked down against the tubes, which will hold them in place while removing the backing and tubes. The tubes are soldered in place with minute pieces of 24-k. gold. (Fig. 2.) The backing is again put in place and burnished. This forms the foundation on which the porcelain body is baked to contour to suit the case, or if for anterior teeth, the back of a facing is ground out to a thin shell (Fig. 3), and the body is placed between the backing and the facing and baked in the furnace, when it will be ready to be cemented to the bridge (Fig. 4), making a repair which cannot be detected and having all the strength of the original. Fig. 5 shows the finished repair.

The tubing can be made by cutting a strip of plate, No. 35 or 36 gage, slightly wider than the diameter of the pins; fold it loosely round a wire and pass it through a draw plate gradually from a large hole to a smaller one until the size desired is obtained, removing the wire as soon as the flat strip begins to assume the shape of a tube. The seam can be closed with a small amount of 24-k. gold.

Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.



Dr. Joseph Roach—"Treatment of Sensitive Teeth by the Hurd Apparatus, and Filling with Amalgam." Dr. Roach's clinic consisted of a practical demonstration of the efficiency of the Hurd apparatus in anesthetizing a patient for the excavation of dentin in a very sensitive tooth. He claimed that he could prolong the anesthesia for an indefinite time by first giving a sufficient amount of nitrous oxid, then allowing the patient to breathe air until signs of consciousness appear, when more gas is administered. The clinician said that while the use of this apparatus made anesthesia very simple and easy, still every precaution and care should of course be taken, as in the administration of any other anesthetic.

THE DENTAL COSMOS

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Devoted to the Interests of the Profession.

EDITED BY

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PHILADELPHIA, MAY 1905.

EDITORIAL DEPARTMENT.

THE PROBLEM OF DISEASE INVASION.

To those concerned with the study of disease causation no phase of the question presents more striking and interesting features than the several changes in the point of view which have arisen from time to time as new facts throwing light upon the fundamental factors of the problem have been discovered. From the clouds and mists of religious superstition and ignorance, through a period of pure empiricism, the knowledge of the body and its functions began to develop under the stimulus of scientific observation and research until now all that concerns the problem is being rigorously subjected to the test of exact investigation; and rationalism is becoming the standard of medical thought with scientific knowledge as its basis.

The line of demarkation between the modern scientific standard in medical thought and the previous stage of pure empiricism may unquestionably be fixed at the period when Pasteur and Koch, twenty-five to thirty years ago, made known the nature of bacterial action in the causation of fermentation and of disease, and published to the world of science methods for bacterial research that made possible the general prosecution of the work of investigation by other observers in these lines of inquiry. So momentous and important were the results obtained by these observers and their successors, so direct and satisfying were the answers which

their findings apparently gave to the question of disease causation, that there appeared to be nothing more for the investigator to do but to discover the specific bacterium for each disorder and a practical mode for combating its evil effects, and the emancipation of humanity from disease invasion would be assured. The proved causal relation of certain bacteria to certain diseases, and the general prevalence of the bacterial element in practically all pathological conditions, led to the attitude of mind which may be stated as follows: Bacteria cause disease, therefore the prevention and cure of disease is the problem of eliminating bacteria as a factor therein. Hence followed the war of extermination waged by medical science upon the microbe—the era of antiseptics and germicides.

But the problem of the ages was not to be solved upon such simple and direct lines. The light which was shed upon it by the germ theory of disease was so brilliant that observers emerging from the darkness of the past were temporarily blinded to certain other factors directly bearing on the question of disease causation, and when men as the result of study and research began to grow more familiar with the part played by bacteria in the biological scheme, and especially with the manner in which these minute organisms performed their vital activities, new and important considerations obtruded themselves as factors which have served to modify or qualify the earlier conceptions of disease causation. The general fact having been established that bacteria cause disease, the question then obtruded itself: In view of the universal prevalence of bacteria, why is it that they do not always produce disease? In other words, the problem of immunity as well as susceptibility pressed for a solution. It is upon this question that scientific observation appears to be concentrating itself.

The evidence thus far attained presents the interesting feature that individuals normally healthy resist bacterial invasion more effectively than those not up to the normal standard of health, from which it follows that any error in the nutritional process decreases the efficiency of the individual in so far as resistance to bacterial invasion is concerned, just as it decreases efficiency when measured in any terms of potential,—a general proposition which has been verified in many different ways by scientific test. Immunity—at least, relatively speaking—is, then, conditioned upon normal nutrition just as good health is so conditioned. Whatever may be the scheme by which normal nutrition operates as an immunizing condition is a dependent question to the general fact that it does so operate.

Errors in nutrition—or malnutrition—lessen resistance to bacterial invasion, and become therefore predisposing causes of disease. More than that, malnutrition is a disease itself; for normal health demands upon the part of the organism the performance of certain groups of cell activities according to a more or less definite method, to the end that adaptation of

the individual to his environment may be harmonious within the limits of greatest efficiency. Failure to reach this norm of vitality quickly removes the individual from the physiological classification and places him within the pathological category.

It is the recognition of these general principles which seems to characterize the present line of activity in the study of disease causation. The principles upon which bacteria as exciters of disease perform that function are made out with reasonable clearness; the natural defensive forces of the bodily economy against bacterial invasion are the subject of immediate scientific interest.

We published in April Cosmos, page 519, a *résumé* of a paper by Dr. Donald F. Shearer of London which originally appeared in the *Lancet* of February 11, 1905, on "Carbonic Acid as a Factor in the Genesis of the Gouty State." We regret that our space limitations prevented the republication of the paper in full. The question of the "gouty state" is one which has had considerable attention in the literature of dentistry because of the occurrence of certain well-marked oral and dental lesions observed in connection with the arthritic diathesis. The paper of Dr. Shearer is one deserving of thoughtful consideration because it does much to clarify the view as to the nature of the morbid element in the class of individuals denominated gouty, or arthritic, and there is much evidence of a clinical and scientific character to support the view set forth by the author that an excess of carbon dioxid in the blood is the morbific element which is the common factor to be found in all cases of arthritism and which is the cause of many of the disease phenomena which these cases present. Nearly all writers agree that arthritism is a diathetic condition—a fault of nutrition characterized by insufficient oxidation. Dr. Shearer agrees with this view and shows that defective elimination of carbon dioxid is a result of this imperfect oxidation.

We have elsewhere pointed out that an excess of carbonic acid in the blood plasma results in a reaction between that compound and the sodium phosphate of the same fluid and upon which the alkalinity of the blood largely depends. The result of the reaction between the carbonic acid and the sodium phosphate is the production of acid sodium phosphate and sodium bicarbonate, as follows:

$$H_2CO_3 + HNa_2PO_4 = H_2NaPO_4 + HNaCO_3$$

The same type of reaction also occurs in the case of the basic calcium phosphate under the influence of carbonic acid,—in each instance the corresponding acid phosphate is formed, the reaction probably taking place for the most part in the cortex of the kidney. As these acid salts of sodium and of calcium are more soluble and have a relatively higher

osmotic tension than the basic salts from which they were derived, they are more easily eliminated, up to a certain point, by the kidneys. The action of an excess of carbonic acid in the blood plasma as here stated will thus help to account for the excessive loss of phosphates via the kidneys so often observed in arthritics, producing the nutritional disorder known as phosphaturia described at length in its clinical features by Teissier of Lyons, France, and Ralfe of London. It is interesting to note in this connection that the acidity of the urine measured as acid phosphates becomes an index of the excess of carbonic acid in the blood plasma, each molecule of acid phosphate in the urine representing a molecule of carbonic acid fixed as sodium bicarbonate in the blood stream. The acid phosphates of the urine thus become the coefficient of the carbonic acid content of the blood plasma.

In its dental relations this type of malnutrition is of interest in that the excessive production of acid phosphates frequently leads to their excretion by the buccal mucus glands, giving rise to dental erosion, and there is reason to believe that the general lowering of vital resistance which the disturbance of nutrition from this cause entails acts as a predisposing factor in that group of necrotic phagedenic infective inflammations which destroy the retentive structures of the teeth, leading to their loss, and known collectively as pyorrhea alveolaris—so generally associated with the type of malnutrition here under consideration. In presenting this aspect of the question it is not with the purpose of minimizing the importance of the germ theory of disease or of the part played by bacteria as exciters of disease, but rather to point out that there is evidence accumulating which tends to the conclusion that the problem of bacterial invasion is not exclusively a question of the potentialities of the pathogenic bacterium, but quite as much it is a question of the resistive powers of the body, and that bodily resistance is in its turn a factor of normal health and of immunity.

BIBLIOGRAPHICAL.

A NAKED-EYE ANATOMY OF THE HUMAN FACE. By THOS. E. CONSTANT, Licentiate of the Royal College of Physicians, London; Licentiate in Dental Surgery and Member of the Royal College of Surgeons of England. Bristol: John Wright & Co. London: Simpkin, Marshall, Hamilton, Kent & Co., Ltd., 1905.

Dr. Constant's book embraces not only a discussion on the subject embodied in the title of the work, but also a considerable amount of data on the anatomy of the jaws and neighboring structures. It is divided into fifteen chapters and an appendix, as follows: Chapter I: Introductory. Chapter II: The Temporary Teeth. Chapter III: The Permanent Teeth. Chapter IV: The Occlusion of the Teeth. Chapter V: The Mouth. Chapter VI: The Bony Framework of the Jaws. Chapter VII: The Temporo-Mandibular Joint. Chapter VIII: The Movements of the Mandible. Chapter IX: The Tongue, Soft Palate, and Tonsils. Chapter X: The Salivary Glands. Chapter XI: The Muscles of the Lips and Tongue. Chapter XII: The Vascular Relations of the Teeth and Contiguous Parts. Chapter XIII: The Fifth Cranial Nerve. Chapter XIV: Sectional Anatomy of the Teeth. Chapter XV: The Jaws and Teeth at Various Periods of Life.

As may be seen by the foregoing list of chapters, the scope of the book is very much broader than that implied by its title; it is to be regretted, however, that the contents are by no means free from errors, some of which are of more than casual significance.

On page 3 we find the statement that "Cementum is true bone." This of course is at variance with the findings of histological investigators. True bone has as its characteristic the Haversian systems, which are absent in cementum.

On page 44 the author states that "As the manner of contact—or occlusion, as it is technically termed—is of some importance, the attention of the reader is directed to Plate V, which shows the method of occlusion of the permanent set." Why the author should refer the reader to Plate V is more than we can attempt to explain. The plate, a beautiful half-tone engraving of the skull, shows a denture in which not a single tooth articulates in the correct way, except perhaps the upper and lower incisors. To first call attention to the importance of occlusion and then refer the reader to a case of marked malocclusion is an oversight which the sooner remedied the better for both author and reader.

On page 93 this statement appears: "The tonsils have for a long time been considered to be the chief factors in the production of certain forms of malformation." Does the author mean that the tonsils may become factors in the etiology of dental malformation even when perfectly normal, or does he intend to convey the correct impression that when hypertrophied or abnormally large they interfere with nasal breathing and thereby become indirectly factors in the arrest

of maxillary development and in the formation of V-shaped arches? As it now stands this statement may lead to an erroneous conception, as the tonsils are not *per se* responsible for any malformation of the face or mouth.

These errors, as well as the use of such antiquated and long-abandoned terms in dental nomenclature as "fang," crusta petrosa, etc., should be corrected in a future edition. They detract from the value of the book, which apart from the errors which we have pointed out is well adapted for the purpose which the author expects it to fulfill.

The author has treated the subject in a concise way, eliminating all unnecessary details and adhering strictly to the elucidation of those points which to the dental student are of the greatest importance.

The publishers are to be congratulated upon the excellence of the typographical work. The half-tone plates are of standard quality, and the *ensemble* is beyond criticism. J. E.

REVIEW OF CURRENT DENTAL LITERATURE.

Conducted by JULIO ENDELMAN, D.D.S.

[*New York and Philadelphia Medical Journal*, November 19, 1904.]

PASSAGE OF A TOOTH-PLATE THROUGH THE ALIMENTARY TRACT. By M. K. Elmer, M.D., Bridgeton, N. J.

The author reports the case of a man aged fifty-nine who during a paroxysm of coughing swallowed an upper plate of three teeth. The only physical sign that could be detected was a laceration on each side above the tonsils passing down the sides of the pharynx and such as would be made by the sharp edges of a plate. He could swallow liquids without inconvenience, but no solids, which would lodge on the plate and block the passageway, causing nausea, vomiting, and fulness in the epigastrium. The day after the accident and for some time following he complained of dysphagia and hoarseness. All these symptoms continued almost uninterruptedly for about four years, when the plate was passed; the patient soon recovered.

Dr. Roe, of Rochester, in his collection of the different kinds of foreign bodies requiring operation for their removal, shows that tooth-plates predominate. Out of 156 operations, 49 were for tooth-plates.

[*l'Odontologie*, Paris, March 30, 1905.]

STYPTICIN IN THE TREATMENT OF HEMORRHAGES FOLLOWING THE EXTRACTION OF TEETH.

Stypticin is a crystalline powder of yellow color, bitter taste, soluble in water, and a powerful hemostatic both general and local. It has given satisfactory results in the treatment of hemorrhages of the digestive and respiratory tracts and particularly of that type which occasionally follows the extraction of teeth. The hemostatic properties of stypticin were successfully applied by Munk (*Aerztl. Central-Anzeiger*, 1899, No. 27). The results obtained by him have been confirmed by Bloch (*Wien. Zahnarztl. Monatssch'ft*, 1899, No. 12) and later by Jahl (*Zahnarztl. Rundschau*, 1900, No. 406). Bloch has used it in powder form, carrying it to the wound by means of a pledget of cotton. It was this that originated the idea of manufacturing stypticin gauze. Marcus (*Deut. Zahnarztl. Zeitsch'ft*, 1900, No. 123) is in favor of employing stypticin in the treatment of dental hemorrhages. He calls it an ideal hemostatic agent and recommends the use of the gauze as devised by Bloch. Long-continued and profuse hemor-

rhages have been arrested by this means almost immediately after the application of the gauze.

Stypticin is odorless, and besides its hemostatic property it has a stimulating action upon the surface of wounds.

Hulich (*Zahnarztl. Rundschau*, 1900, No. 431) has obtained excellent results with stypticin in the treatment of hemophiliacs. In cases of dental hemorrhage he places a one-grain tablet of stypticin in the alveolus which is then tamponed with any suitable material. The local action of stypticin may be greatly enhanced by the internal administration of the agent in doses of 5 to 6 gr. per diem. In cases of serious hemorrhages in hemophiliacs instantaneous action may be secured by injecting 2 cc. of a ten per cent. solution of stypticin in distilled water.

OXYGEN IN THE TREATMENT OF PYORRHEA ALVEOLARIS AND FISTULOUS TRACTS. By M. Leger-Dorez, Paris, France.

After discussing the etiology of pyorrhea alveolaris the author describes the method of treatment which he advocates. After removing all the calcareous deposits from the surfaces of the affected tooth he at once proceeds to extirpate the pulp under cocain anesthesia, after which he introduces into the canal a dressing of freshly prepared tincture of iodin or forty per cent. formalin.

Having carried out these preliminary steps, the tooth and adjacent structure are then ready for the oxygen application. To an oxygen cylinder the author attaches a rubber tube and to the free extremity of this a heavy Pravaz needle. The needle is introduced into the cavity through which the pulp was removed and is there adjusted to place by means of wax. The stream is then gradually turned on, and being under pressure will reach all the crevices of the pulp-chamber and canals, forcing ahead of it the iodin or the formalin. If the disease has progressed to the extent of causing a certain degree of disintegration of the pericementum, the gas will escape through the gingival border. In the presence of a fistulous tract the oxygen will follow the tract, impregnating the tissues with the agent used in the canal after the pulp was removed. The author's experience with this method has been unusually gratifying, and in his report he has embodied a number of cases of pericemental inflammation cured by this means. If after several such treatments the disease appears to be totally eradicated, Mons. Leger-Dorez fills the root-canal permanently with the formula suggested by Dr. Robin, as follows: Creasote 10 parts, formalin 40 per cent. 10 parts, zinc oxid q. s. fiat pasta.

[*La Presse Medicale*, Paris, March 4, 1905.]

SCOPOLAMIN AS A GENERAL ANESTHETIC. By F. Ferrier and A. Desjardins.

The alkaloid scopolamin, $C_{17}H_{21}NO_4$, is obtained from the *Scopolia japonica*. It comes in the form of prismatic crystals soluble in water and especially in alcohol and ether. It decomposes in contact with air or light. The bromid is the salt usually employed. It paralyzes the inhibitory fibers of the pneumogastric, is a vaso-dilator and an active general anesthetic. Thus far, in over 1500 cases anesthesia has been brought about with this agent in Germany. It is employed hypodermically, and to the solution a slight quantity of morphin is added to counteract the toxicity of the agent. The dose usually employed is 1 mgm. This amount together with 1 cgm. of morphin is dissolved in 1 cc. of water.

For laparotomies a mixed anesthesia of scopolamin and chloroform is recommended. A 1 mgm. injection is made two hours before the operation, and the chloroform is administered as usual immediately before the intervention. It is claimed that by this means a smaller amount of chloroform is required, the period of excitement is abolished, vomiting is prevented, and likewise contractions of the abdominal walls, and post-operative pain. With the preliminary scopolamin injection only one-fifth the amount of chloroform usually required is sufficient to bring about the degree of anesthesia desirable for surgical operations. Twenty or thirty minutes after the injection a feeling of drowsiness sets in. At first it is a very common occurrence for the patient to resist this spontaneous sleepy sensation, although he eventually yields gracefully to the somnolent influence. Respiration is quiet, and throughout the period of sleep the mouth remains slightly open. After a second injection sleep is more profound, reflex ac-

tivity decreases, and respiration remains quiet, although it decreases in frequency, and the pulse is slightly accelerated. At this period the patient may be aroused, but will remain awake but a few seconds. After the third injection sleep is complete and the anesthesia sufficiently deep to perform painlessly any surgical operation. The face becomes slightly flushed owing to the vaso-dilatation which scopolamin induces. The frequency of respiration is decreased to from 12 to 16 times per minute. The pulse becomes full, distinct and regular, but rapid, varying from 90 to 120.

The stage of complete muscular relaxation is never reached, and, while the limbs may be easily moved, muscular tonus is never entirely lost.

A very important feature in connection with this agent is that even after the third injection, when sleep is complete and sensibility totally abolished, the patient can be aroused, showing that the vital functions are not interfered with, and furthermore that the anesthetic action is mainly upon the sensory nerves. The period of insensibility persists for from twenty-four to forty-eight hours, so that the patient does not suffer from any post-operative pain.

The author summarizes the advantages and disadvantages of scopolamin as follows:

Advantages: Suppression of fear and of the period of excitement which usually precedes the stage of muscular relaxation; complete suppression of sensibility; length of sleep, from eight to ten hours; absence of nausea, malaise, and vomiting; quietness of the patient, who will sleep throughout the night following the operation without the necessity of administering morphin; absence of albumin from the urine; absolute innocuousness; persistence of the anesthesia long after the operation, the patient never complaining of any post-operative pain.

Disadvantages: Scopolamin is inconsistent in its action. In some patients it acts at once, while in others it induces but partial sleep, it being often necessary to complete the anesthesia with chloroform; vaso-dilatation, which generally interferes with the operation; contraction of the abdominal wall, it being therefore contra-indicated in abdominal surgery. However, a 1 mgm. injection does not cause either abdominal contraction or vaso-dilatation, although it has all the advantages above enumerated.

The toxicity of scopolamin is less than that of any other anesthetic. Although twelve fatal cases have been recorded in connection with scopolamin anesthesia, none can be traced directly to the anesthetic, as has been clearly shown by Dirk and Israel.

[*Dental Summary*, April 1905.]

SOME USES OF FORMALDEHYD IN DENTISTRY. By Dr. E. H. Ewald, Portsmouth, Va.

Regardless of the use of formaldehyd in the treatment of putrescent conditions in root-canals, the author finds it available in those cases in which an arsenical application has not completely devitalized the pulp, the crown portion only being sufficiently affected to be removed painlessly.

He places in the cavity a small quantity of a four per cent. formaldehyd solution with a little cocain added to it, and by this means is enabled to remove the remainder of the organ almost painlessly. In the treatment of chronic alveolar abscess of long standing, with fistula, a five per cent. solution of formaldehyd forced through the root into the fistula brings about a cure after two or three treatments.

[*Dental Review*, March 15, 1905.]

SYMPTOMS INCIDENT TO DENTITION. By Walter R. Ramsey, M.D., St. Paul, Minn.

The author states that until recent years many of the ills of infancy, and especially those involving the digestive tract and nervous system, were attributed by the profession as well as by the laity to dentition. Within the past few years scientific research has demonstrated that many of the symptoms which were formerly attributed to dentition are due to bacteria which gain entrance to the alimentary tract by means of infected milk, resulting often from dirty utensils. Since a more exact knowledge of the cause of these affections has gradually spread from the profession to the laity, the cholera infantum of a few years ago has practically disappeared from private practice, and even in the densely populated parts of our great cities and in asylums, where from 20 to 50 per cent. of all infants under one year died during the

hot summer months, the mortality is being rapidly diminished. The result of the scientific crusade of the past few years has been to attribute all symptoms of a pathological character to some form of infection, and many of the leading observers have said during this reactionary period that dentition, being a physiological process, is attended by no symptoms whatever, and that those appearing at that time were purely a coincidence and due to other causes. This radical stand is not now taken by the most observing of the profession, for, although dentition normally is a physiological process, there is no doubt that in a certain percentage of cases symptoms of a varying degree of significance result. One authority believes from his own observation that about one-half of healthy children have no symptoms, and the remainder have some, of a varying degree of intensity.

The result of the scientific investigation to which the author refers is at variance with the clinical experience of dentists having under their supervision the care of infants' mouths. While it is unquestionably true that many of the disturbances of infancy are due to infection of the alimentary canal either through the ingestion of impure milk or the use of unclean feeding apparatus, yet we must not lose sight of the fact that in this class of cases the infection *per se* would be powerless to cause these manifestations if the organism were in a condition of normal vital resistance. Before the infection can exercise its detrimental effects as manifested by disorders of the digestive apparatus the infant's vitality must be markedly decreased. This is exactly what takes place in the course of pathological eruption of the deciduous organs. The intense nervous irritation, the result of pressure against the unprotected pulp, is invariably the cause of reflex manifestations of varied degrees of intensity. In some cases it amounts merely to a state of fretfulness, lack of appetite, and slight digestive disturbances. In others the nervous phenomena are the predominant ones. These, as is well known, manifest themselves in convulsions, which in some cases lead to a fatal issue. In other cases digestive disorders constitute the most severe symptoms. In all, however, the predisposing cause is the decreased vital resistance of the infant, due to the nervous irritation and pain which must of course result from the continued severe pressure upon the highly sensitive organ. It is a fact beyond doubt that pain will decrease the vital forces more quickly than any other disturbance.

The author states that symptoms incident to difficult dentition may be divided into three classes:

First. Symptoms resulting from a well-defined local inflammation.

Second. Reflex symptoms resulting, apparently, from local inflammation.

Third. Reflex symptoms where there is no apparent local inflammation.

He reviews the general symptoms of pathological dentition, and states that "In a certain percentage of the cases a circumscribed, whitish, shiny area of the mucous membrane will be noticed stretched over the crown of the underlying tooth. This area is raised above the surrounding mucous membrane, and around the base there is an area of inflammation. Such a condition is due to the fact that atrophy has not taken place as rapidly as it should, so that the mucous membrane is subjected to pressure, resulting in an amount of pain and other reflex disturbances, depending upon the amount of tension, the constitutional make-up of the infant, and other factors determined by environment."

It has been found that the symptoms arising from the pressure of a tooth against the mucous membrane never result in reflex disturbances, but that they are due to pressure against the formative organ of the erupting tooth.

The reviewer has elsewhere pointed out this fact, stating that to attribute the reflex nervous irritation to the piercing of the gum by the erupting tooth is a *reductio ad absurdum*, inasmuch as it is not brought about to any appreciable extent by pressure against the overlying gingival membrane, but by contrecoup against the highly sensitive formative organ—the pulp. At the time of eruption the roots of the teeth are incompletely calcified, the pulps being exposed at the root-ends. The resistance offered to the erupting organ by the often tenacious and dense gingival covering being frequently greater than the force of eruption, the tooth for a time remains practically at a standstill. The calcification of the root is in the meantime progressing in the opposite direction and meeting with as

great a resistance against the surrounding bony tissue. Consequently the developing tooth becomes the opposing body to two forces, one from above and the other from below, or *vice versa*, according to whether the tooth be an upper or a lower. The resultant of these forces produces severe irritation and pain because of the undue degree of pressure, not against the fully calcified crown portion of the tooth or the gum, which is able to withstand a relatively intense degree of pressure without any great inconvenience, but against the highly vascular and sensitive pulp.

It is therefore decidedly injurious to wait, as the author says, until the mucous membrane over the crown of the tooth is white and shiny, showing that there is an area of inflammation at its base. The gum should be lanced as soon as reflex manifestations appear in order to relieve that type of irritation above referred to, with all its concomitant manifestations.

[*International Dental Journal*, April 1905.]

GONORRHEAL ULCERO-MEMBRANOUS STOMATITIS. By Eugene S. Talbot, Chicago, Ill.

The essayist states that since Neisser discovered the gonococcus in 1878 much light has been thrown upon obscure infections in different parts of the body. The germ is known not to be confined to urethral discharges, but nearly every structure, particularly the mucous membranes, may become involved. He quotes the investigations of W. L. Baum (*Practical Medicine Series*, vol. x, 1904; of J. P. Tuttle (*Morrow's System*, vol. i, 1893); of C. W. Cutler (*New York Medical Journal*, January 25, 1889); R. Larson (*St. Louis Medical and Surgical Journal*, 1896), and R. B. Kimball (*Medical Record*, November 14, 1903).

Two cases have been observed by Dr. Talbot in the past six months. One was that of a traveling salesman aged thirty-six, who was referred to Dr. Talbot for local treatment. There was a history of gonorrhea with continual urethral discharge. The mucous membrane of the entire upper alveolar process was involved. The gingival border of the mucous membrane was destroyed and the alveolar process was exposed. Marked inflammation with excessive swelling occurred. Interstitial gingivitis extended throughout the alveolar process and the teeth were loose. The pain was so severe that sleep was out of the question. Salivation was excessive. The raw ulceration was covered with a glazed surface of greenish-gray color. Local application of glycerol was used for three days, when he left the city, at which time pain was not so severe. The time was too short to notice any improvement of the mucous membrane.

The other case was that of a clerk aged forty-five, married, who had contracted gonorrhea twenty-four years before. He had suffered from gleet ever since. The anterior upper alveolar process was exceedingly inflamed and raw. It was badly swollen. He suffered severe pain. Interstitial gingivitis was very profuse. The incisors were loose and were removed. The surface was ulcerated and raw, with a glazed surface of greenish-gray color. Examination of the tissues revealed the presence of the specific organism. Applications were first made of glycerol, then of silver nitrate. The inflammation subsided in the anterior part of the mouth, but spread posteriorly, involving the tissues as far back as to include the soft palate. Argyrol 25 per cent. was then prescribed. Both these cases seem to have been infected through the nngers.

[*Oesterr.-ungar. Vierteljahrsschrift für Zahnheilkunde*, Vienna, January 1905.]

A SUGGESTION TO FACILITATE THE PLACING OF THE RUBBER DAM. By Dr. Hermann Bardach, Vienna.

The author suggests a method of holding the rubber dam in place which is as effective as it is simple in its execution. Instead of ligating the teeth to prevent the rubber from sliding toward the occlusal surfaces he uses rubber wedges as employed in the process of separating teeth. After placing the rubber dam in the usual way, pieces of rubber of suitable size are carried into the approximal spaces and against the gingival border. By this means the rubber will be held in position, moisture will be prevented from oozing through the holes in the dam, and the teeth will be slightly separated—sufficient to allow of properly finishing the filling if on the mesial or distal side.

PERISCOPE.

To Clean Slabs.—To remove hardened cement from cement slabs, rub slab and cement with aqua ammonia. The cement is readily removed by this, and then the slab can be cleaned by washing.—*Dental Summary.*

Rubber Bands.—Use rubber bands instead of floss silk for cleaning between the teeth. Also use rubber bands for ligatures to hold rubber dam in place. No. 12 Faber bands will be found convenient.—*Dental Review.*

To Prevent Engine Cord from Slipping.—A little beeswax and resin applied to the engine cord will prevent it from slipping. Try this the next time you are without a rubber rim.—R. M. Pearce, *Dental Review.*

Lubricating Oil.—To prevent the spreading of lubricating oil cut slips of blotting paper, and after lubricating bearings, joints, etc., apply a slip and so absorb the superfluous oil. The slips can be inserted in places difficult to reach with a rag, and with no liability of fluff or threads getting into the mechanism.—*Elliott's Quarterly.*

Lime-water for Viscid Saliva.—In patients whose saliva is viscid and tenacious, and where the teeth are covered with glutinous material, a mouth-wash of lime-water—procured at the drug store—will clear up the condition and relieve the difficulty better than anything. The constant use of lime-water in such mouths will eventually change the character of the secretions, and facilitate the cleaning of the mouth and teeth.—*Dental Review.*

Purification of Mercury.—It consists in placing the impure mercury in a bottle along with finely powdered loaf sugar and water, corking the bottle and shaking vigorously, then by means of a bellows blowing air into the bottle; again corking and shaking the bottle, repeating this performance several times, when finally the mercury is run out of the bottle and into a cone of stiff paper with a pinhole at its apex. The mercury filters clear from the metallic oxids produced from the action of air and sugar upon the debasing metals in the impure mercury.—H. H. Boom, *Stomatologist.*

Retention of Fillings in Weak Teeth.—When the tooth has been so weakened by decay that there is not sufficient sound tooth-structure in which to anchor the filling, the cavity may be lined with soft cement and the filling built into it while still in the plastic state, depending upon the cohesive properties of the cement to retain the filling. But it is only in such cases that this method of anchorage should be resorted to.—J. F. Wallace, *Dental Era.*

To Precipitate Gold from a Solution containing Other Metals.—Make the solution thoroughly acid by either nitric or hydrochloric acid. Then add from ten to one hundred cubic centimeters commercial formalin, according to quantity; the action is hastened by gentle heat; pure gold in crystalline condition is completely precipitated and separated from a solution also containing mercury, zinc, lead, tin, etc.—F. J. McInnes, *Brit. Dental Journal.*

An Aid in Making a Large Porcelain Inlay.—After making a very large contour inlay of high-fusing porcelain for a devitalized tooth, additional anchorage can be obtained by fusing a knob of Jenkins' Prosthetic Enamel at the inner part of the base and drilling out in the center of the tooth for this projection. This can be done after the matrix is removed and inlay tested, provided the material used is of the high-fusing variety.—Will S. Payson, Castine, Me.

Taking Impressions.—I have one little suggestion to offer in the taking of impressions—particularly in those cases that are extremely sensitive and easily nauseated—that I have found useful and helpful, and that is to sponge the mouth with hydrogen dioxid. After having thus cleaned all the mucous surfaces, apply a 3 : 100 solution of eucain to the whole palate. That will enable one to take an impression in the most exaggerated cases of palatal sensitivity.—T. B. Hartzell, *Dental Review.*

Making a Plate Line on a Cast.—Usually this is accomplished by making a mark with a pencil on the cast, where the border of the plate is intended to extend. The wax plate is

then trimmed so that the edge conforms to the outline of the mark. This would be satisfactory if the model and mark could be preserved after vulcanizing, but as this is practically impossible, it is necessary to resort to some other method to accurately determine the location of the correct edge of the plate after it has been vulcanized. This is easily accomplished by cutting a small groove in the cast at the border of the plate. The rubber will sink into this groove, and show distinctly after being taken from the flask, and the operator can easily trim the surplus rubber from the plate with a feeling of security.—L. T. O. R., *Dental Review.*

Simple Remedies for Ill-fitting Vulcanite Dentures.—It quite often happens that a vulcanite denture is found to be loose and unsatisfactory, even though made from a very good impression. Very often the cause of the denture not fitting is over-heating when finishing with pumice and felt wheels, cones, etc., the gum portion, if thin, quite often changing shape from this cause. I have found in a good many cases (not all by any means) that by passing the part affected over a Bunsen burner, until soft, it may be pressed into the desired shape and hardened by dipping into cool water. It will harden without, of course, but it is better for the finger, holding the part in place, to have water handy, as the vulcanite gets quite hot. I have by this method made dentures fit to the entire satisfaction of the patient and myself, that otherwise I should have had to remake.—J. B. Bird, *Odontoblast.*

Do We Underestimate the Value of the Excavator?—There was a time when excavators did it all; today they merely supplement the bur. And this suggests that the inordinate and unnecessary use of the bur is responsible for most of the torture complained of by the longsuffering occupants of the chair, and the grudge they cherish against the dental engine. Few of our patients hesitate in their answer as to which they prefer, the machine-operated bur or the hand-manipulated excavator. Without a doubt we use the bur too much; we use it when and where it is not only unnecessary, but undesirable, whether from the viewpoint of the patient or that of the operator. It fails utterly in many cases where the hand-excavator measures up fully to the necessities of the case. Why not revive interest in and rehabilitate this most useful of accessories? Further delay may relegate the instrument and skill in its use to the list of arts that have been lost.—*Dental Office and Laboratory.*

Sulfuric Acid in the Removal of Pulps with Calcific Formations.—I shall only touch upon one point in regard to the removal of the pulp by pressure anesthesia, and that is the application of cocain to pulps in which we have a secondary dentin formation, and the difficulty of getting these cases anesthetized. In about ten per cent. of all the cases where I attempted to remove the pulp by pressure anesthesia, I was unable to get the pulp anesthetized with cocain. In a few instances I have observed that this was due to a calcific formation in the pulp. I have obtained good results in these cases by the application of sulfuric acid. It is not painful, as one might think. Make an application, and wait for a few minutes; then wipe the cavity out with sodium carbonate, and many times you will be able to get the pulp anesthetized. I should say that in about sixty per cent. of the cases in which we have a good pulp, there is a calcific formation there of some character. You may be able to expose a portion of the pulp, you may be able to get hemorrhage, but at the same time the conditions have produced an irritation sufficiently long to cause a formation, and in that way you have a diseased pulp, and in many of these cases you cannot get anesthesia sufficient to remove the pulp at that time.—George W. Cook, *Dental Review.*

Cases in which Modeling Composition is Indicated.—The choice of any impression material should always be determined by the character of the mouth and the end to be attained, rather than by the perfection with which the exact form of the mouth may be copied, or the ease with which the impression may be removed from the mouth. This is particularly applicable to the maxilla, where the alveolar ridge or a portion of it is soft or flabby, especially in the anterior part of the mouth, as is frequently the case where an upper denture has previously been worn with only the natural anterior lower teeth for articulation. In such cases a firmer or harder impression material is required to compress such soft areas, in order to obtain a plate which shall have a uniformly firm bearing in the mouth. An accurate impression of such cases will invariably result in an unsuccessful denture. In these cases I prefer modeling compound, because I have less difficulty in obtaining the necessary compression of the soft ridge. Some who are greatly attached to plaster claim to arrive at the same result by using plaster thickly mixed, and there is no doubt that this can be so accomplished if the proper mix of plaster is obtained. How-

ever, as already stated, I have met with less difficulty in securing the desired compression of the soft ridge by the use of modeling compound.—O. A. Weiss, *Dental Review.*

How to Remove Plaster Impressions from the Mouth.—To aid in breaking the impression, I prefer to cut it with a sickle-shaped instrument having a square end, so as to cut a narrow groove along the center of the occlusal surfaces of the teeth. The grooves may be cut through to the occlusal surfaces of the teeth, or very nearly so, then the broad end of a stiff spatula may be inserted in the groove and a prying motion exerted, whereupon it readily fractures as desired. A similar groove should be cut over the canines upon the labial surface, and in lower cases it is often necessary to cut grooves upon the lingual surface, depending upon the positions of the teeth and the difficulties to be overcome. In all cases the position of the teeth should be carefully observed before placing the impression material in the mouth, in order to have a correct idea regarding the cutting of the grooves. After the impression has been removed, I prefer to assemble the pieces in the tray. This is usually accomplished with very little trouble, if the pieces are carefully washed and lightly brushed with a soft brush, so as to remove all crumbs of plaster. Unless this is done the little crumbs of plaster formed during the removal of the impression, and always adherent to the pieces, will of course interfere and prevent correct assembling of the pieces in the tray. The pieces of the impression should be immediately washed after removal from the mouth, else the crumbs of plaster become so firmly adherent that it is very difficult to remove them. If the plaster has been allowed to set thoroughly in the mouth before attempting removal, the pieces after removal will not be injured in the least by washing and light brushing.—O. A. Weiss, *Dental Review.*

Modeling Composition or Plaster?—The impression material to be used in partial cases is a debatable question. In all cases where the remaining teeth are in good position—where there are no perceptible undercuts nor the teeth perceptibly inclined, and the soft tissues are of a uniformly firm character—plaster is undoubtedly preferable as an impression material. In those cases where the remaining teeth are more or less inclined, or where the undercuts or dovetail spaces exist, the question becomes debatable. It is claimed by some that "the more difficult the case the greater the demand for plaster." Exceptions to this statement must be taken. In those difficult cases, when a perfect impression has been obtained, and a plate made therefrom, such plate cannot be placed in position in the mouth until more or less cutting has been done, oftentimes more than is really necessary, because it is not always possible to see just where the cutting should be done, or just how much should be done, whereupon the plate when finally in position in the mouth does not fit perfectly. When modeling compound impressions are taken in such cases they of course are imperfect, but if carefully taken they are no more imperfect than the fit of the plate must be in order to permit its being placed in position in the mouth. When a modeling compound impression is removed in a partial case, only such distortion about the teeth takes place as is necessary to permit its removal, which is identical with the alteration necessary in a plate made from a perfect impression in order to place such plate in the mouth. After careful consideration of this question, pro and con, it is my opinion that no advantage is gained in the use of plaster impressions in those "difficult partial cases."—O. A. Weiss, *Dental Review.*

Formulas for Gold Solder.—If in the formulas for plate and solder given in the text-books the number of grains of the precious metal in each pennyweight is first given, the formula itself announces the karat. It is rather more scientific to state the parts in thousands; either, however, is explicit. The use of alloys should be discarded. There is no advantage in their use; they are confusing and unreliable. The following formulas I use in my own laboratory. They flow freely, have good color, and are as tough and pliable as plate. Between their fusing-point and that of the metals for which they are intended there is ample margin. The 18-karat will flow freely upon silver plate, and the 22-karat upon 18-karat plate, in either case the plate being overheated. This is my test of their fusibility:

Twenty-two-karat gold solder: 22 parts pure gold, 1 part pure copper, 1¼ parts pure zinc.

Eighteen-karat gold solder: 18 parts pure gold, 3 parts pure silver, 2 parts pure copper, 1½ parts pure zinc.

Silver solder: 19 parts pure silver, 1 part pure copper, 4 parts pure zinc.

There is a slight loss of zinc, especially in making gold solder, not from oxidation, as the books generally state, but from volatilization, which is quite a different thing. A frac-

tion of a grain is added to allow for this. If pure metals are used, there is so little oxidation that as a rule the crucible from which the solder is poured is left perfectly clean; so clean, indeed, that they are promptly broken to avoid the temptation of using them again—a dangerous experiment, as the borax usually penetrates the bottom, and causes them to leak when used a second time.—W. H. Trueman, *Dental Office and Laboratory.*

Application of the Inlay Principle to Bridge Work.—We will take for example a case in which the upper lateral incisor is missing, the adjoining teeth being comparatively sound. Instead of crowning the canine or central incisor, simply devitalize the canine and prepare the lingual surface for the reception of a gold inlay with post of iridio-platinum. A cavity is prepared, the walls slightly diverging so that the long axis of the filling will approximate the long axis of the tooth. This is very important, in order to avoid difficulty in getting the bridge to place when finished. After the cavity is prepared, swage or burnish a pure gold matrix of No. 40 gage until a perfect fit is obtained. The root-canal having been reamed out, the next step is to punch a small hole in the matrix at the opening into the canal, and through this hole force a square iridio-platinum post of No. 16 gage, driving it to the end of the reamed canal. Remove with great care, so that the matrix will cling to the post without change of position, and solder matrix to post over a Bunsen burner. Now cut off the end of post projecting through the matrix, and replace the matrix and post in the cavity. Give the matrix a final burnishing, and fill to proper contour with Parr's fluxed wax, which, being thoroughly chilled before removing, prevents distortion of matrix, and also serves as a guide to the eye in building the gold to proper contour. The matrix is then removed and invested. The lingual contour is carefully noted and the wax removed. The matrix is now filled with Vernon's gold or moss fiber moderately packed by hand pressure until the contour has been restored. It is then saturated with liquid flux, which it absorbs as blotting-paper does ink. Twenty-karat solder is then flowed upon it until a slight excess of contour is obtained. The solder penetrates the gold thoroughly and a solid gold inlay results, which can be dressed down to the level of the enamel, and which will maintain its contour absolutely in the succeeding soldering. The inlay with post is now inserted in the tooth, and the lateral facing selected and ground to proper contact with gum, backed with pure gold plate, and attached to the inlay while *in situ* with Paris wax, which is very sticky and tough, and very hard when chilled. The wax is then contoured on the lingual surface to properly occlude with antagonizing teeth. The entire piece is then chilled with cold water, removed, and invested for soldering. After soldering and polishing, the bridge is simply cemented to place.—J. W. O'Bryon, *Dental Brief.*

The Combined Use of Cohesive and Non-cohesive Gold.—Placement of non-cohesive gold by the wedge principle is as old as dentistry, and no man who has practiced for many years has failed to observe how fillings of this class have preserved teeth. It is difficult to build out with this material to any considerable extent, and consequently many who desire to restore lost contour have resorted to the use of cohesive gold. I consider that a combination of the two forms of gold facilitates our work, and saves fatigue to the patient and strain to the operator. I do not question that the results obtained by those who employ cohesive foil are as satisfactory as I can obtain with the combination material, but I do contend that the effort of the former is much more laborious, and I am insistent that those who work entirely with cylinders cannot obtain as satisfactory results with cohesive cylinders at the gingival seat as can be obtained with non-cohesive cylinders at that situation. A series of cylinders of suitable length are selected, and they are placed on the gingival seat of the cavity with only the pressure that can be brought to bear with foil pliers. Prior to their condensation the series of cohesive cylinders are pressed into place with the same pliers, and then condensation is completed with hand plugger points. After these have been pressed home with the hand plugger points, the condensation is completed with a mallet. Then the margins are burnished with a flat smooth burnisher, and all the margins are protected by burnishing the excess over the margin. This portion of the filling is now finished with strips. At that stage of the filling, the matrix is put in position and the filling completed with cohesive gold cylinders. The advantage of burnishing and finishing off at the gingival border prior to the completion of the filling is that this is the most difficult portion to finish after the filling is completed. The contour of many a filling has been destroyed in the efforts to finish perfectly the gingival margin, when we have waited until the final completion of the filling to finish at that point.—John I. Hart, *Items of Interest.*

OBITUARY.

DR. CLARKE LAMOTTE GODDARD.

DIED, suddenly, from valvular disease of the heart, in San Francisco, California, March 30, 1905, CLARKE LA MOTTE GODDARD, A.B., A.M., D.D.S., in his fifty-sixth year.

Dr. Goddard was born in Beloit, Wis., on June 26, 1849, being the son of Elisha and Julia Goddard of that city. He was educated in the public schools of Beloit, graduating from the high school in 1868. He entered Beloit College in the autumn of that year, graduating with honor in 1872 with the degree A.B. He then decided to prepare himself for the profession of dental surgery, matriculating in the Philadelphia Dental College, Philadelphia, Pa., in October 1872, and after completing the course with great credit to himself and honor to his alma mater, he was graduated in the class of 1874 with the degree D.D.S.

Immediately upon his graduation he became associated in practice with Dr. A. E. Brown of Chicago, Ill., but at the end of a year severed his connection and removed to San Francisco, Cal., arriving in that city March 17, 1875. In the same year his alma mater conferred upon him the A.M. degree. For about a year after his arrival in San Francisco he was associated in practice with Dr. J. L. Cogswell. Later he entered the office of Dr. H. E. Knox, remaining with him for about eight years. In 1884 he opened an office under his own name, where his large acquaintance, superior attainments, and professional skill soon won for him a large and lucrative practice. During the last fifteen years he had associated with him in practice his nephew, Dr. H. D. Noble.

Dr. Goddard was a man of studious habit, of an analytical turn of mind, of great mechanical ingenuity, and superior manipulative skill, all of which combined to make of him a practitioner of pre-eminent ability. His studies were, however, never wholly confined to his profession, for he was a man of broad culture and large general scientific attainments. He, with others, was instrumental in the organization of the Dental Department of the University of California, which was incorporated in 1881.

He was elected by the Board of Regents of the University of California to the professorship of mechanical dentistry, and retained this position from the opening of the dental department in 1882 to the end of the college year 1889, when he resigned that chair to accept the professorship of orthodontia, which he held from 1890 to 1902. He was dean of the dental department in 1883, and again in 1886-88 and 1899-1902. He severed his connection with the dental department at the close of the college year 1902, much against his own inclinations and the wishes of his associates, after a faithful, devoted and self-sacrificing service of twenty years. This step was taken as the result of his physical condition and at the dictate of prudence. Only his intimate family associates were cognizant of the physical condition which forced him to lay down his college work, consequently his sudden and untimely demise came as a great shock to his associates, friends, and acquaintances.

Dr. Goddard was endowed with qualities which made him a teacher *par excellence*. He possessed in an unusual degree the ability to impart instruction and the power to stir enthusiasm in his students for any subject that he might present to them. As a consequence he was always a popular teacher, and he succeeded in impressing his genial personality and studious habits upon his students to such a degree that they became thereafter his faithful emulators and his life-long friends.

As a professional man and a teacher he was always found in the ranks of those who were striving for higher professional ideals and for broader culture as a pre-requisite for entrance upon professional study. It was largely through his efforts that the preliminary requirements for entrance to the dental department of the University of California and the length of the academic year were constantly kept a little in advance of the requirements of most other dental schools.

His contact with his professional brethren was always that of the high-toned ethical gentleman. His discoveries and inventions along the lines of his profession were always freely given to his *confrères* for the benefit of suffering humanity. He was never known to speak unkindly of anyone, and never allowed himself by speech or action to unjustly criticize a professional brother.

He was a man of extreme modesty and of a highly sensitive nature, consequently a personal injustice cut him to the quick. And yet his nature was so forgiving that he always made excuses for those who had treated him unkindly or tried to injure him. He rarely resented a personal injury or an unjust criticism, but he could not endure to hear his friends maligned or see them injured without making a vigorous protest.

Socially he was of genial disposition, devoted to his friends, a royal entertainer, and a charming host. His home life was ideal. The expression of his affection for the members of his family was most beautiful in its quietness and modesty. His home was the center of his life, but from it was radiated a great love and a generous liberality toward all who might need a helping hand. No one ever appealed to Dr. Goddard when in distress to be turned away empty-handed. He was generous to a fault, and yet he did not dispense his gifts with a careless or thoughtless hand. Fortune had been kind to him, and so far as his means allowed he took delight in contributing to the happiness of others.

Dr. Goddard was a man of more than ordinary literary attainments, being a frequent contributor to the periodical dental literature. He was one of the collaborators of the "American Text-Book of Operative Dentistry," having prepared for that volume the chapters on the "Management of the Deciduous Teeth" and "Orthodontia Exclusively as an Operative Procedure." At the time of his death he had just completed for the use of students a handbook on Orthodontia which it is hoped his heirs will have published. During the later years of his life he devoted considerable time to the study of comparative odontology, having gathered together a large variety of skulls and teeth. He had also instituted a series of studies of the cingules and cusps of the human teeth, with a view to clearing up certain questions relating to their evolution. These studies, it is to be regretted, were still incomplete at the time of his death.

He was a member of the Delta Sigma Delta Fraternity, and took an active interest in both its local and national affairs.

He has been frequently honored by the profession, having been elected president of the San Francisco Dental Association in 1891; president of the Oakland Dental Club in 1898; chairman of Section VII of the World's Columbian Dental Congress, held in Chicago in 1893; chairman of the Dental Section of the American Medical Association held in San Francisco, Cal., in 1894; vice-president of the National Association of Dental Faculties in 1893; president of the Pacific Coast Dental Congress held in Portland, Oregon, in 1898, and at the time of his death was a member of the Committee on Essays of the Lewis and Clark Dental Congress to be held in Portland, Ore., in July 1905.

He was very fond of travel, having visited Europe several times with the various members of his family. Photography was his hobby, and he indulged his love of the beautiful by making many photographs of scenes that appealed to his esthetic sense.

Dr. Goddard was married to Miss Louise Bunker of San Francisco on August 30, 1881. This union was blessed by the birth of two children—a son, Malcolm, now in the University of California, and a daughter, Florence, who is in the graduating class of the Miss Head Seminary, Berkeley, Cal.—who with their mother remain to mourn their great loss.

His loss to the profession which he so much loved is irreparable. The influence upon the world of such lives as his are beyond estimation, and it is difficult to understand why they should be removed or how they can be spared. Few men in the profession have been so greatly loved and respected as was Dr. Goddard, and no man in the community in which he lived will be more greatly missed or more sincerely mourned. His was a great nature, and his heart went out to everyone in love and sympathy. *Requiescat in pace.*

——— J. S. M.

Resolutions Passed by the Los Angeles Association of Dental Alumni.

The Los Angeles Association of Dental Alumni, at a special meeting, passed the fol-

lowing resolutions of regret upon the loss sustained by the removal of Dr. Goddard:

Whereas, The Almighty Father in His infinite wisdom has seen fit to remove Dr. C. L. Goddard from among us, to our deep sorrow; therefore be it

RESOLVED, That the members of the Association of Dental Alumni of Los Angeles realize that by his death we have lost a great, grand, and good man, and the dental profession a zealous worker, a conscientious teacher, and a scientist of high rank, and one universally beloved for his gentle, refined, and kind nature. By his removal the association loses a loyal friend and a willing helper. And be it further

RESOLVED, That these resolutions be spread upon the minutes, and that an engrossed copy of the same be sent to the widow of Dr. Goddard as an expression of our heartfelt sympathy in her bereavement.

WM. BEBB,
D. CAVE,
L. E. FORD,
Committee.

SOCIETY NOTES AND ANNOUNCEMENTS.

DENTAL SOCIETY MEETINGS: May, June, and July, 1905.

MAY.

ALABAMA DENTAL ASSOCIATION. Gadsden. Four days: May 9th to 12th.

DISTRICT OF COLUMBIA DENTAL SOCIETY AND MARYLAND STATE DENTAL ASSOCIATION. Baltimore. Three days: May 25th to 27th.

EASTERN INDIANA DENTAL ASSOCIATION. Greenfield. Two days: May 3d and 4th.

FLORIDA STATE DENTAL SOCIETY. Seabreeze. May 31st.

GEORGIA STATE DENTAL SOCIETY. Atlanta. Three days: May 4th to 6th.

ILLINOIS STATE DENTAL SOCIETY. Moline. Three days: May 9th to 11th.

IOWA STATE DENTAL SOCIETY. Des Moines. Three days: May 2d to 4th.

KANSAS STATE DENTAL ASSOCIATION. Topeka. Three days: May 18th to 20th.

KENTUCKY STATE DENTAL ASSOCIATION. Lexington. Two days: May 15th and 16th.

LAKE ERIE DENTAL ASSOCIATION. Cambridge Springs. Three days: May 16th to 18th.

LEBANON VALLEY DENTAL ASSOCIATION. Pottstown. Two days: May 16th and 17th.

LOUISIANA STATE DENTAL SOCIETY. New Orleans. Three days: May 4th to 6th.

MISSOURI STATE DENTAL ASSOCIATION. St. Louis. Three days: May 24th to 26th.

NEBRASKA STATE DENTAL SOCIETY. Lincoln. Three days: May 16th to 18th.

NEW HAMPSHIRE DENTAL SOCIETY. Manchester. Three days: May 9th to 11th.

NEW YORK STATE DENTAL SOCIETY. Albany. Two days: May 12th and 13th.

OKLAHOMA DENTAL ASSOCIATION. Oklahoma City. Three days: May 15th to 17th.

TEXAS STATE DENTAL ASSOCIATION. Austin. Three days: May 18th to 20th.

WISCONSIN (SOUTHERN) DENTAL ASSOCIATION. Racine. Two days: May 30th and 31st.

JUNE.

INDIANA STATE DENTAL ASSOCIATION. Indianapolis. Three days: June 27th to 29th.

MASSACHUSETTS DENTAL SOCIETY. Boston. Three days: June 7th to 9th.

MINNESOTA STATE DENTAL ASSOCIATION. Minneapolis. Three days: June 1st to 3d.

N. CAROLINA DENTAL SOCIETY. Waynesville. Four days: June 28th to July 1st.

NORTHERN OHIO DENTAL ASSOCIATION. Cleveland. Three days: June 6th to 8th.

PENNSYLVANIA STATE DENTAL SOCIETY. Philadelphia. Three days: June 27th to 29th.

JULY.

AMERICAN MEDICAL ASSOCIATION—SECTION ON STOMATOLOGY. Portland, Oregon. Four days: July 11th to 14th.

LEWIS AND CLARK DENTAL CONGRESS. Portland, Oregon. Four days: July 17th to 20th.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS. Buffalo, N. Y. July 24th.

NATIONAL ASSOCIATION OF DENTAL FACULTIES. Buffalo, N. Y. July 27th.

National Dental Association. Buffalo, N. Y. Four days: July 25th to 28th.

New Jersey State Dental Society. Asbury Park, N. J. Four days: July 19th to 22d.

Examiners' Meetings.

Arkansas Board of Dental Examiners. Texarkana. May 22d and 23d.

Connecticut Dental Commissioners. Hartford. May 27th.

District of Columbia Board of Examiners. Washington. July 5th to 7th.

Florida Board of Dental Examiners. Seabreeze. May 29th.

Illinois Board of Dental Examiners. Chicago. May 4th to 6th.

Iowa Board of Dental Examiners. Des Moines. May 2d and 3d.

Kansas Board of Dental Examiners. Topeka. May 15th to 17th.

Kentucky Board of Dental Examiners. Louisville. June 6th.

Maryland Board of Dental Examiners. Baltimore. May 15th and 16th.

Massachusetts Board of Registration. Boston. June 21st to 23d.

Minnesota Board of Dental Examiners. Minneapolis. June 5th to 7th.

New Hampshire Board of Registration in Dentistry. Manchester, June 13th to 15th.

New Jersey Board of Registration. Trenton. July 11th to 13th.

Oklahoma Board of Dental Examiners. Oklahoma City. May 15th to 17th.

Pennsylvania Board of Dental Examiners. Philadelphia and Pittsburg. June 6th to 9th.

Rhode Island Board of Registration. Providence. June 27th to 29th.

South Dakota Board of Dental Examiners. Mitchell. July 11th.

Texas Board of Dental Examiners. Austin. May 15th.

Vermont Board of Dental Examiners. Montpelier. July 5th to 7th.

West Virginia Board of Dental Examiners. Morgantown. June 7th to 9th.

Wisconsin Board of Dental Examiners. Milwaukee. June 26th.

"F. D. I."

INTERNATIONAL DENTAL FEDERATION.

The next annual meeting of the Executive Council of the Fédération Dentaire Internationale will convene in Hanover, Germany, August 7, 1905, immediately following the annual meeting of the Central-Verein Deutscher Zahnärzte. Announcement of the program for the meeting and the projected work for the Federation during the present period will shortly be made through the dental journals and through the official bulletin of the Federation.

Edward C. Kirk, *Secretary-general.*

NATIONAL DENTAL ASSOCIATION.

The ninth annual session of the National Dental Association will be held in Buffalo, N. Y., July 25 to 28, 1905, inclusive.

The Hotel Iroquois has been selected by the local committee of arrangements as headquarters, where all general sessions of the Association and of the sections will be held. The clinics will be held at the rooms of the Dental Department, University of Buffalo.

Rates at the Hotel Iroquois are, single room per day $1.50, $2.00, and $2.50; rooms for two persons, $3.00 and $4.00; single rooms with bath $3.00 and $3.50; rooms with bath for two persons $5.00, $6.00, $7.00, and $7.50; all rooms on the European plan.

The usual railroad rate of one and one-third fare for the round trip, certificate plan, has been arranged for by the Executive Committee.

All pay full fare going, taking the proper certificate therefor from the ticket agent, which when properly certified at the meeting, entitles the holder to return for one-third the regular rate.

Tickets going may be purchased from July 20th to 26th, and are good returning until and including August 2d.

Both the general officers and those of the sections have been working hard to provide an interesting and instructive program, and a large attendance is expected.

A. H. Peck, *Rec. Sec'y,*
92 State st., Chicago, Ill.

NATIONAL DENTAL ASSOCIATION—CLINIC SECTION.

The National Dental Association will meet at Buffalo, N. Y., commencing July 25th. It is the desire of the president and chairman of the Clinic Section to hold the best clinic in the history of the Society. The clinics will be held Wednesday and Thursday, July 26th and 27th, in the Buffalo Dental College, where there is every facility for making practical operations, as well as ample room for all those wishing to give table clinics. Forty dental operations will be made each day, and there is room for holding three hundred table clinics. Those interested can apply for further information to any one of the following:

Dr. S. W. Bowles, 1315 New York ave., Washington, D. C., chairman for District of Columbia, Delaware, and New Jersey.

Dr. E. C. Blaisdell, 1 Pleasant street, Portsmouth, N. H., chairman for Maine, New Hampshire, and Vermont.

Dr. F. W. Gethro, 31 Washington street, Chicago, chairman for Illinois and Wisconsin.

Dr. L. L. Barber, Spitzer building, Toledo, Ohio, chairman for Ohio and Indiana.

Dr. S. Eschelman, 421 Franklin street, Buffalo, N. Y., or Dr. R. Murray, 715 Elmwood avenue, Buffalo, N. Y., chairmen for New York and Ontario, Canada.

Dr. M. F. Finley, 1928 1st street, Washington, D. C., chairman for District of Columbia, Virginia, and West Virginia.

Dr. T. P. Hinman, 22 S. Broad street, Atlanta, Ga., chairman for Georgia, North Carolina, South Carolina, Florida, Alabama, Mississippi, Tennessee, Louisiana, and Texas.

Dr. H. B. McFadden, 3505 Hamilton street, Philadelphia, Pa., chairman for Pennsylvania.

Dr. G. E. Savage, 518 Main street, Worcester, Mass., chairman for Massachusetts, Connecticut, and Rhode Island.

Dr. S. H. Voyles, 3201 Washington avenue, St. Louis, Mo., chairman for Missouri, Arkansas, Kansas, and Nebraska.

Those having new instruments, appliances, etc., are cordially invited to display them. Communicate with your state chairman or with

E. K. Wedelstaedt, *Sec'y Clinic Section*,
204 N. Y. Life Bldg., St. Paul, Minn.

NATIONAL DENTAL ASSOCIATION—SECTION III.

In preparation for the meeting of the National Dental Association at Buffalo, N. Y., July 25 to 28, 1905, original papers and investigations are asked to be submitted upon the following topics: Oral surgery, anatomy, physiology, histology, pathology, etiology, hygiene, prophylaxis, materia medica, and allied subjects.

J. D. Patterson, *Ch'man Sect. III.*,
Kansas City, Mo.

"LEWIS AND CLARK" DENTAL CONGRESS.

The Lewis and Clark Dental Congress to be held in Portland, Oregon, July 17, 18, 19, and 20, 1905, promises to be the largest ever held on the Pacific Coast.

General Committee.

Norris R. Cox, D.D.S., *Chairman*, Abington Bldg., Portland, Oregon.

Arthur W. Chance, D.D.S., M.D., *Secretary*, 809-810 Dekum Bldg., Portland, Oregon.

The following associations are in affiliation:

Oregon.—State Dental Association. Stomatological Club.

California.—State Dental Association. Southern California Dental Association. San Francisco Dental Association. Alameda County Dental Society.

British Columbia. — British Columbia Dental Association.

Washington.—State Dental Association. Seattle Dental Club. Tacoma Dental Club. Spokane Dental Club.

Idaho.—State Dental Association.

Montana.—State Dental Association.

Utah.—State Dental Association.

Nevada.—

Committees.

Executive Committee.—Norris R. Cox, Portland, Chairman; C. S. Irwin, Vancouver, Wash.; Arthur W. Chance, Portland, Secretary; Jean Cline, Portland; E. G. Clark, Portland.

Committee on Essays.—S. J. Barber, Portland, Chairman; C. L. Goddard,* San Francisco; B. F. Eschelman, Tacoma.

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*Deceased.

Committee on Clinics.—G. H. Nottage, Portland, Chairman; J. M. Meyer, Tacoma, Wash.; C. E. Post, San Francisco; A. Stark Oliver, Spokane, Wash.; Claude W. Gates, Salt Lake, Utah; J. H. Holmes, New Westminster, B. C.; A. W. Cate, Boise, Idaho; W. H. Barth, Great Falls, Mont.; F. I. Shaw, Seattle, Wash.

Committee on Exhibits and Manufacturing Clinics.—W. F. Lewis, Portland, Chairman; Woodard, Clarke & Co., Portland; Archer & Schanz Co., Portland; John Welch Dental Depot, Portland; Oregon Dental Supply Co., Portland.

The Committee on Clinics asks for voluntary clinics or table demonstrations from members of the profession, and suggests that notice of the same be sent the committee as soon as possible. In order that the program be complete, names of clinicians and clinics must reach the chairman of Clinic Committee not later than June 15th.

AMERICAN MEDICAL ASSOCIATION—SECTION ON STOMATOLOGY.

THE next meeting of the American Medical Association will be held in Portland, Oregon, July 11 to 14, 1905. The program for the Section on Stomatology is as follows:

1. Chairman's Address. Vida A. Latham, Chicago.
2. "The Causes and the Treatment of the Mouth-Manifestations of Certain Metabolic Disorders." Alfred C. Croftan, Chicago.
3. "The Oral Manifestations of Diabetes Mellitus." Hermann Prinz, St. Louis, Mo.
4. "The Urine and Saliva in So-called Pyorrhea Alveolaris." Wm. J. Lederer, New York City.
5. "Further Researches in the Treatment of Interstitial Gingivitis." Eugene S. Talbot, Chicago.
6. "Excretion of Toxic Products into the Mouth, with Relation to Local Infection." Fenton S. Turck, Chicago.
7. "The Relations of Dentistry to General Medicine." Samuel Hopkins, Boston, Mass.
8. "A Common Ground for Medicine and Dentistry." Frank L. Platt, San Francisco.
9. "The Physician as a Dentist." Calvin W. Knowles, San Francisco.
10. "The Physician's Duty to the Child, from a Dental Standpoint." Alice M. Steeves, Boston, Mass.
11. "Dentistry of Tomorrow." H. P. Carlton, San Francisco.
12. "What Will Probably be the Dental Educational Standard for the Coming Decade?" C. C. Chittenden, Madison, Wis.
13. "Fatal Oral Pathologic Conditions." G. V. I. Brown, Milwaukee, Wis.
14. "Surgical Bacteriology of the Mouth." A. H. Levings, Milwaukee, Wis.
15. "Surgical Aspects of Disturbed Dentition of the Third Molar." M. L. Rhein, New York city.
16. "The Treatment of Suppurative Affections of the Face and Neck Emanating from the Mouth." M. I. Schamberg, Philadelphia.
17. "The Medical Relations of Certain Conditions of the Mouth." L. Duncan Bulkley, New York city.
18. "Some Effects of Inebriety on the Teeth and Jaws." T. D. Crothers, Hartford, Conn.
19. "The Ossification of the Lower Jaw." Edward Fawcett, Bristol, Eng.
20. "Ankylostomiasis and Tongue Pigment." T. M. Russell Leonard, Grenada, B. W. I.
21. "Notes on Tooth-Genesis in Man." H. W. Marett Tims, London, England.
22. "The Etiology of Tooth-Corrugations." G. Lenox Curtis, New York city.
23. "To What Extent are Teeth Necessary to the Human Being?" M. H. Fletcher, Cincinnati, Ohio.
24. "Anesthesia by Ethyl Chlorid and Similar Agents." H. C. Miller, Portland, Oregon.
25. "The Roentgen Rays in Dentistry." M. Kassabian, Philadelphia.

The program is entirely scientific. All dentists are invited to be present and take part in the discussions. Those wishing to become members may do so by filling out blanks furnished by the Association, signed by the president and secretary of a state or local dental or medical society. Inclose five dollars, and send to the secretary of the Section on Stomatology for his signature. This also includes the *Journal of the American Medical Association* for one year.

VIDA A. LATHAM, *Chairman.*
EUGENE S. TALBOT, *Sec'y,*
103 State st., Chicago, Ill.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

THE annual meeting of the National Association of Dental Examiners will be held at the Iroquois Hotel, Buffalo, N. Y., beginning Monday at 10 A.M., July 24, 1905, and continuing until adjournment. The rates per day for single rooms will be $1.50, $2, and $2.50, $3 and $4 for double, and $3 and $3.50 for rooms with bath. The sessions will be held in commodious rooms in the hotel. Write early and secure your accommodations. Arrangements have already been made for members from the East for reduced excursion rates on the fast trains of the Delaware and Lackawanna Railroad, leaving New York 10 A.M., 6.10 P.M., 8.45 P.M., and 2 A.M. It is earnestly requested that the secretaries of the boards will communicate at once any changes in members' names and addresses.

CHAS. A. MEEKER, *Sec'y*,
29 Fulton st., Newark, N. J.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

THE annual meeting of the National Association of Dental Faculties will be held in Buffalo, N. Y., commencing at 2 P.M. Thursday, July 27, 1905. The Executive Committee will meet at 10 A.M. on the same day.

Special business to come before the N. A. D. F. is the consideration of the proposed revision of the constitution and by-laws.

H. B. TILESTON, *Chairman Ex. Com.*,
JOHN I. HART, *Sec'y Ex. Com.*,
New York, N. Y.

LOUISIANA STATE DENTAL SOCIETY.

THE regular annual meeting of the Louisiana State Dental Society will be held at the lecture rooms of the New Orleans College of Dentistry on May 4, 5, and 6, 1905.

There will be several papers and interesting clinics. The attendance and co-operation of every ethical dentist is most kindly solicited.

A. L. PLOUGH, *Cor. Sec'y*,
New Orleans, La.

GEORGIA STATE DENTAL SOCIETY.

THE next meeting of the Georgia State Dental Society will be held in Atlanta, Ga., May 4, 5, and 6, 1905.

D. H. MCNEILL, *Cor. Sec'y*,
Athens, Ga.

ALABAMA DENTAL ASSOCIATION.

THE next annual meeting of the Alabama Dental Association will be held in Gadsden, Ala., May 9 to 12, 1905.

It is earnestly desired and confidently expected that we will have a large attendance, and the most successful meeting in the history of the Association.

L. A. CRUMLY, *Sec'y*,
118½ 19th st., Birmingham, Ala.

NEW YORK STATE DENTAL SOCIETY.

THE thirty-seventh annual meeting of the Dental Society of the State of New York will be held at Albany, N. Y., Friday and Saturday, May 12 and 13, 1905, convening at 10 o'clock on the morning of the first day, in Assembly Hall, at the Hotel Ten Eyck, where the committee of arrangements have made special rates for all attending the convention. Special railroad rates have also been secured. Ask for a special certificate when you purchase your ticket, as without it you cannot have the benefit of the reduced rates on the return trip.

In addition to the regular reports of the standing and special committees the officers and business committee present the following list of essayists: President's Address, Wm. Jarvie. Correspondent's Report, Ellison Hillyer. Report of Committee on Practice, A. L. Swift. Report of Committee on Scientific Research, F. W. Low; with other papers as follows:

1. "The Chemistry of Pulp-Decomposition with Reference to the Discoloration Problem, and a Rational Method of Treating These Conditions." J. P. Buckley, Chicago.
2. "Ethics." A. H. Peck, Chicago.
3. "A Field for Women in Dental Practice." Edwin T. Darby, Philadelphia.
4. "Some Observations upon the Dental

Contents of a Mastoid Cyst." (Illustrated with Lantern Slides.) I. N. Broomell, Philadelphia.

5. "Our State Society: A Study and an Appeal." C. W. Stainton, Buffalo.

6. "Retention of Porcelain Corners." R. Ottolengui, New York.

The CLINICS are as follows: E. Carlton Palmer, Philadelphia, Pa., "Continuous-Gum Work, using the Hyzer Llewellyn Oil Furnace for Baking." T. A. Coney, East Stroudsburg, Pa., "Porcelain Block Carving and Filling." W. B. Dills, Brooklyn, N. Y., "The Carving of the Different High-Fusing Bodies in Crown Work." E. Parmely Brown, Erie, Pa., "All-Porcelain Bridge Work." G. W. Cochran, Erie, Pa., "Old and New Way of Constructing Porcelain Shell Crowns." E. B. Spaulding, Detroit, Mich., "Reproducing the Entire Natural Enamel with Porcelain." W. C. Middaugh, Easton, Pa., "Jenkins' Prosthetic Porcelain as Applied to Pivot Teeth." C. W. La Salle, Rochester, N. Y., 'A New Porcelain Crown." J. F. Adams, Toronto, Canada, "Ground Porcelain Inlays." G. N. Wasser, Cleveland, Ohio, "Porcelain Inlay." R. H. Hofheinz, Rochester, N. Y., "Gold Inlays Set with Gutta-Percha." C. F. Bunbury, Rochester, N. Y., "Gold Inlays from Plate Gold." R. M. Sanger, East Orange, N. J., "Half-Collar Crown." F. W. Peeso, Philadelphia, Pa., "Removable Bridges and Abutments." H. H. Tompkins, Utica, N. Y., 'Replaceable Dummy Tooth (Brewster)." C. C. Bachman, Waterloo, N. Y., "Removable Facings for Bridge Work, using Vulcanite or Plain Teeth." Sinclair Tousey, M.D., New York city, "X-Ray Demonstration." Morris I. Schamberg, Philadelphia, Pa., "Illustrating by Specimens, Photographs, and Radiographs the Detailed Technique in the Various Operations for the Amputation of Roots." Rolof B. Stanley, New York city, "Orthodontia Models of Cases of Malocclusion, with Results After Treatment." V. H. Jackson, M.D., New York city, "Jackson System of Regulating." F. Messerschmitt, Rochester, N. Y., 'Construction of Jackson Regulating Appliances." J. H. Beebee, Rochester, N. Y., "Making Darby Tin." E. T. Darby, Philadelphia, Pa., "Fillings from Shavings of Freshly Cut Tin." J. F. McLoughlin, North Adams, Mass., "Rowan's Extra Pliable Gold Rolls, and Rolled Gold for Contour Work." S. G. Perry, New York city, "The Use of the Combined Separator and Matrix and the Hand Matrix (Perry)." E. B. Lodge, Cleveland, Ohio, "Tin and Gold Fillings in Disto-occlusal Cavities, with the Aid of the Lodge Band-Matrix and Matrix Pluggers." A. J. McDonagh, Toronto, Can., "Instrumentation in Pyorrhea, using the Mells Prophylactic Instruments." C. F. C. Mehlig, New York city, "Antiseptic Instrument Handles and Bracket Table Attachments." W. H. Leak, Watertown, N. Y., "Amobilis: An Antiseptic and Mummifying Paste." H. S. Miller, Rochester, N. Y., "Method of Packing and Investing Plate for Vulcanite." F. C. Brush, New York city, "Some Practical Hints." Washington Dailey, New York city, "New Forms of Intermaxillary Elastics to Assist in Correcting Malocclusion of the Teeth." H. R. Abbott, London, Ont., Can., (subject to be announced in program). H. Franz, Chicago, Ill., "A Method of Constructing Crowns and Caps in Cases of Abnormal Attrition of the Natural Teeth." C. J. Grieves, Baltimore, Md., 'Anterior Bridge-Dummies; Preparation of Cavities for Porcelain Inlays, with Reference to Incisal Edges." F. E. Roach, Chicago, Ill., "A New Fusible Filling Material." Joseph Head, Philadelphia, Pa., "Formation of Matrices." J. H. Beebee, Rochester, "Paper vs. Napkins." G. W. Cochran, Erie, Pa., "The Surgical Treatment of Chronic Alveolar Abscess."

The committee of arrangements are planning for an exhibit of old and curious dental instruments, odd and abnormal models, old books, pictures, etc. All members are requested to bring to the meeting anything antique or interesting to the profession, or such articles may be forwarded to Dr. J. L. Appleton, Albany.

There will be a large exhibit of dental appliances and supplies. For information regarding exhibits address Dr. J. L. Appleton, 89 Columbia st., Albany, N. Y.

A cordial invitation is extended to all members of the profession, and it is hoped that every member attending may be in his place at the beginning of the opening session.

WM. JARVIE, *Pres.*, Brooklyn, N. Y.,
WM. C. DEANE, *Sec'y*,
616 Madison ave., New York city.

ILLINOIS STATE DENTAL SOCIETY.

The annual meeting of the Illinois State Dental Society will be held at Moline, May 9, 10, and 11, 1905.

Elgin MaWhinney, *Sec'y*,
Chicago, Ill.

TEXAS STATE DENTAL ASSOCIATION.

The Texas State Dental Association will meet at Austin, Texas, May 18, 19, and 20, 1905. All ethical members of the profession are invited to meet with us.

Bush Jones, *Sec'y*,
Dallas, Texas.

EASTERN INDIANA DENTAL ASSOCIATION.

The Eastern Indiana Dental Association will hold its thirty-fifth annual meeting at Greenfield, Ind., May 3 and 4, 1905. A splendid program of papers and clinics is being prepared.

G. E. Stevenson, *Sec'y*,
Liberty, Ind.

OKLAHOMA DENTAL ASSOCIATION.

The fifteenth annual meeting of the Oklahoma Dental Association will be held in Oklahoma City, beginning at 8 p. m., May 15, 1905, and continuing until the evening of the 17th. Indications are for a large and enthusiastic meeting. The profession is cordially invited to attend.

C. L. White, *Sec'y*,
115½ Main st., Oklahoma City, Okla.

LEBANON VALLEY DENTAL ASSOCIATION.

The thirtieth annual meeting of the Lebanon Valley Dental Association will be held at Pottstown, Pa., May 16 and 17, 1905.

Meetings, clinics, and exhibits will be held in the Auditorium, a commodious and well-lighted hall. An excellent opportunity for exhibits. For space write the chairman of the exhibit committee.

C. R. Scholl,
Reading, Pa.

KENTUCKY STATE DENTAL ASSOCIATION.

The next annual meeting of the Kentucky State Dental Association will convene at Lexington, Ky., May 15 and 16, 1905.

We anticipate a most pleasant as well as profitable meeting, and a cordial invitation is extended to the profession.

W. M. Randall, *Sec'y*,
Masonic Bldg., Louisville, Ky.

LAKE ERIE DENTAL ASSOCIATION.

The annual meeting of the Lake Erie Dental Association will be held at Hotel Rider, Cambridge Springs, Pa., May 16, 17, and 18, 1905.

The executive committee expects to present a program of papers and clinics of unusual excellence. All reputable dentists are invited to meet with the association at this famous health resort.

V. H. McAlpin, *Sec'y*,
Warren, Pa.

KANSAS STATE DENTAL ASSOCIATION.

The thirty-fourth annual session of the Kansas State Dental Association will be held in Topeka, May 18, 19, and 20, 1905. Special attention is being given to the clinical program.

A cordial invitation to be present is extended to the profession. Headquarters at Copeland Hotel.

F. O. Hetrick, *Sec'y*,
Ottawa, Kansas.

UNIVERSITY OF CALIFORNIA

Alumni Association—Dental Department.

The annual meeting and clinics of the Alumni Association of the Dental Department of the University of California will be held at the college infirmary, corner of Taylor and Market streets, San Francisco, May 16 and 17, 1905.

Assurance of a large number of clinics will guarantee a successful meeting.

All reputable legal practitioners are cordially invited to be present.

Percy D. Gaskill, *Sec'y*,
San Francisco, Cal.

SOUTHERN WISCONSIN DENTAL ASSOCIATION.

THE eleventh annual meeting of the Southern Wisconsin Dental Association will be held at Racine, Wis., May 30 and 31, 1905.

The profession are cordially invited to attend.

C. W. COLLVER, *Sec'y*,
Clinton, Wis.

MISSOURI STATE DENTAL ASSOCIATION.

THE Missouri State Dental Association will meet in St. Louis, May 24, 25, and 26, 1905.

An excellent program of papers and clinics is being prepared, and all ethical members of the profession are cordially invited to attend.

SAM T. BASSETT, *Cor. Sec'y*,
St. Louis, Mo.

NEW HAMPSHIRE DENTAL SOCIETY.

THE annual meeting of the New Hampshire Dental Society will be held in Masonic Banquet Hall, Manchester, N. H., May 9, 10, and 11, 1905.

FRED F. FISHER, *Sec'y*,
Manchester, N. H.

DISTRICT OF COLUMBIA DENTAL SOCIETY AND MARYLAND STATE DENTAL ASSOCIATION.

THE next union meeting of the District of Columbia Dental Society and the Maryland State Dental Association will be held in Baltimore, May 25, 26, and 27, 1905, at the dental department of the Baltimore Medical College. An interesting program has been prepared, and a cordial invitation to all ethical members of the profession is extended.

F. F. DREW, *Cor. Sec'y*,
Baltimore, Md.

NEBRASKA STATE DENTAL SOCIETY.

THE twenty-ninth annual meeting of the Nebraska State Dental Society will be held at the Lincoln Dental College, Lincoln, Neb., May 16, 17, and 18, 1905.

The clinic committee promises us the best meeting in the history of the society. All reputable members of the profession are invited to attend.

The Lindell Hotel will be the headquarters for all visiting dentists. Do not fail to get a receipt from your local railroad agent for the fare to Lincoln, as this receipt is the only means by which you can secure the return rate.

M. E. VANCE, *Sec'y*,
Lincoln, Neb.

MASSACHUSETTS DENTAL SOCIETY.

THE forty-first annual meeting of the Massachusetts Dental Society will be held in the Massachusetts Charitable Mechanics Association building, Huntington ave., Boston, Mass., June 7, 8, and 9, 1905. An excellent program has been arranged.

CHAS. W. RODGERS, *Sec'y*,
165 Harvard st., Dorchester, Mass.

MINNESOTA STATE DENTAL ASSOCIATION.

THE twenty-second annual meeting of the Minnesota State Dental Association will be held at Minneapolis, Minn., June 1, 2, and 3, 1905.

J. F. MCCREA, *Chairman Ex. Com.*,
Minneapolis, Minn.

INDIANA STATE DENTAL ASSOCIATION.

THE Indiana State Dental Association will meet in Indianapolis, Ind., in the Claypool Hotel, June 27, 28, and 29, 1905. A rousing meeting is promised, with numerous exhibits, on the same floor.

A. T. WHITE, *Sec'y*,
New Castle, Ind.

PHILADELPHIA DENTAL COLLEGE.

ALUMNI SOCIETY.

ALUMNI Day of the Philadelphia Dental College Alumni Society will take place June

1, 1905, at the college building, Eighteenth and Buttonwood sts. An interesting program has been arranged. The morning session will be devoted to clinics, to be given by many well-known men in the profession. At the afternoon session, Dr. Noel of Nashville, Tenn., will present a paper, for which an interesting and full discussion will be arranged. At the banquet several prominent speakers will be heard. A cordial welcome is extended to all.

S. Blair Luckie, *President*,
Max Greenbaum, *Cor. Sec'y*,
401 Weightman Bldg., Phila., Pa.

PHILADELPHIA DENTAL COLLEGE.

Class of 1895.

The tenth anniversary of the class of '95 of the Philadelphia Dental College will be celebrated by a reunion at the college, June 1, at 10 A.M.; the banquet will be at 8 P.M.

T. D. Castro, *Sec'y*,
909 Professional Bldg., Phila.

NORTHERN OHIO DENTAL ASSOCIATION.

The forty-sixth annual meeting of the Northern Ohio Dental Association will be held June 6, 7, and 8, 1905, at Gray's Armory, Cleveland, Ohio.

This is not only one of the oldest, but one of the best attended meetings in the country. This year the program is one of unusual strength and interest. The leading subjects for consideration are — (1) Humanitarian Methods. (2) Mistakes. (3) Prophylaxis. Under the first is considered "High-Pressure Anesthesia," by Dr. C. G. Myers, Cleveland, and "High-Pressure Anesthesia as Compared with Other Pain-Preventing Methods," by Dr. D. H. Zeigler, Cleveland. Essays under the second group include the "Mistakes of the Country Dentists," by Dr. R. D. Wallace, Scio, Ohio; "Mistakes of the City Dentists," by Dr. F. J. Spargur, Cleveland, Ohio, and "Mistakes in Ethics," by Prof. S. H. Guilford, Philadelphia, Pa. The third includes the essays—"The Sources of Tooth-Life, and Their Relative Importance," by Dr. D. D. Smith, Philadelphia, Pa., and "Diseases of the Peridental Membrane and Treatment," by Dr. J. V. Stahl, Wooster, Ohio.

Throughout the entire program much attention will be given to the study of humanitarian methods—methods which make it possible to perform dental operations free from pain.

There will be about fifty clinics selected and arranged to give the knowledge-seeking dentists the best post-graduate course that can possibly be obtained in a three days' meeting. One session will be devoted to the study of manufacturers' exhibits. The exhibits this year are to be one of the interesting features of the meeting, and the committee has been promised one of the largest exhibits shown in the country.

All communications pertaining to clinics or exhibits should be addressed to the corresponding secretary, Dr. W. G. Ebersole, 800 Schofield Building, Cleveland, Ohio.

Special rate of a fare and a third has been granted on the certificate plan by the Central Passenger Association.

The committee extend a most cordial invitation to the members of the profession to attend.

W. G. Ebersole,
Geo. H. Wilson,
Varney E. Barnes,
Ex. Com.

NEW JERSEY STATE DENTAL SOCIETY.

The thirty-fifth annual meeting of the New Jersey State Dental Society will be held in the Auditorium, Asbury Park, N. J., commencing July 19th, and continuing until July 22d. Headquarters will be at Hotel Columbia; rates for one person in a room $3.50, two persons in room $3.00. The meeting will convene promptly at 10 A.M. on the 19th. The various committees have been successful in securing eminent practitioners for papers of present interest and some fifty clinicians in the most modern up-to-date dentistry. The space in the large Auditorium will be almost entirely filled with all the newest appliances in the practice of dentistry.

Friday evening will be devoted to the social side, with a smoker, including a collation

and entertainment to the guests, exhibitors, and members.

Cut out now the week of July 17th, and meet with us. 756 dentists registered last July. Make it a thousand this year.

CHAS. A. MEEKER, *Sec'y*,
Newark, N. J.

NEW YORK INSTITUTE OF DENTAL TECHNIQUE.

AT the regular meeting of the New York Institute of Dental Technique, held at the Hotel Chelsea, March 28, 1905, Dr. F. L. Stanton presented a paper entitled: "Technique of Office Management," and Dr. H. W. Northrup presented a paper on, and demonstrated methods for "Replacing Porcelain Facings on Bridges when a Regular System cannot be Used."

E. DARWIN REED, *Sec'y*,
New York city.

DENTAL COMMISSIONERS OF CONNECTICUT.

THE Dental Commissioners of Connecticut hereby give notice that they will meet at Hartford May 27, 1905, as prescribed by law, and will adjourn to June for the summer examinations, so as to give students who do not finish their college or other educational course until June an opportunity to secure a license to practice without the long delay now made necessary by being required to wait until the following year.

By direction of the Dental Commissioners.

J. TENNEY BARKER, *Recorder*,
Wallingford, Conn.

IOWA BOARD OF DENTAL EXAMINERS.

THE Iowa State Board of Dental Examiners will hold its first meeting for 1905 at Des Moines, in the Capitol building, May 2d and 3d.

The second meeting will be held at Iowa City, June 15th and 16th. All those who expect to take the examination should file their application at least two weeks previously.

E. D. BROWER, *Sec'y*,
Le Mars, Iowa.

VERMONT STATE DENTAL SOCIETY.

AT the twenty-ninth annual meeting of the Vermont State Dental Society, held at Rutland, March 15 to 17, 1905, the following officers were elected for the ensuing year: Geo. F. Barber, Brattleboro, president; Geo. O. Mitchell, St. Albans, first vice-president; C. H. Kent, Barre, second vice-president; Thomas Mound, Rutland, secretary; Grace L. Bosworth, Rutland, corresponding secretary; W. H. Munsell, Wells River, treasurer. Executive Committee—Harry F. Hamilton, Newport; Charles F. Meacham, Bellows Falls; A. Z. Cutler, Bennington. J. A. Robinson, Morrisville, state prosecutor.

The next meeting will be held in Brattleboro, the third Wednesday in May, 1906.

THOMAS MOUND, *Sec'y*,
Rutland, Vt.

MARYLAND BOARD OF DENTAL EXAMINERS.

THE Maryland State Board of Dental Examiners will meet for examination of candidates for certificates May 15 and 16, 1905, at the Dental Department of the Baltimore Medical College, N. Howard st., Baltimore, Md., at 9 A.M.

For application blanks and all further information address

F. F. DREW, *Sec'y*,
701 N. Howard st., Baltimore, Md.

ILLINOIS BOARD OF DENTAL EXAMINERS.

THE next regular meeting of the Illinois State Board of Dental Examiners to examine applicants for license to practice dentistry in this state will be held in Chicago, May 4, 5, and 6, 1905.

Under an opinion of the Attorney-general the following are eligible to take the examination before the board: "Anyone holding a medical diploma from a reputable medical college; anyone who has been a legal practitioner of dentistry for ten years prior to moving into the state, and anyone who failed to

register in this state at the time the law went into effect, which was in 1881."

Candidates must furnish their own patients, and come provided with the necessary instruments, rubber dam, and gold to perform practical operations, and such other work as is deemed advisable by the board. Those desiring to take the examination should matriculate with the secretary at least ten days before the date of meeting. The examination fee is ten dollars. Any further information can be obtained by addressing

J. G. Reid, *Sec'y*,
1204 Trude Bldg., 67 Wabash ave., Chicago.

KANSAS BOARD OF DENTAL EXAMINERS.

The Kansas State Board of Dental Examiners will meet in Topeka, Kansas, May 15, 16, and 17, 1905, for the purpose of examining applicants who desire a license to practice dentistry in this state.

The examination will be both practical and theoretical. Applicants should notify the secretary of their intention to take the examination not later than May 1st, and must be present at nine o'clock on the morning of Monday, May 15th, with instruments and materials ready for all practical work. For further particulars address

M. T. Hults, *Sec'y*,
Hutchinson, Kansas.

OKLAHOMA BOARD OF DENTAL EXAMINERS.

There will be a meeting of the Oklahoma Board of Dental Examiners held at Oklahoma City May 15th to 17th for the purpose of examining candidates for license and such other business as may properly come before it.

The last legislature passed a new dental law that requires all applicants (whether graduates or not) to take the examination, and takes effect June 1, 1905. So this will be the last opportunity for applicants on diploma to receive registration without examination. The fee under the new law is $25.00.

A. C. Hixon, *Sec'y*,
Guthrie, Okla.

TEXAS BOARD OF DENTAL EXAMINERS.

The Texas State Board of Dental Examiners will meet in Austin, Texas, May 15, 1905, for the purpose of examining all applicants. Examinations will be both theoretical and practical. Applicants must furnish their instruments, materials, and patients for any demonstration called for by the Board.

M. S. Merchant, *Pres.*, Giddings, Texas.
C. C. Weaver, *Sec'y*, Hillsboro, Texas.

FLORIDA BOARD OF DENTAL EXAMINERS.

The Florida State Board of Dental Examiners will meet at Seabreeze, Fla., May 29, 1905, at 10 o'clock, for the purpose of examining applicants to practice dentistry. Only those who have diplomas from reputable dental colleges are eligible to examination.

W. G. Mason, *Sec'y*,
Tampa, Fla.

PENNSYLVANIA BOARD OF DENTAL EXAMINERS.

The Board of Dental Examiners of Pennsylvania will conduct examinations simultaneously in Philadelphia and Pittsburg, June 6 to 9, 1905.

For papers or further information applicants must address

N. C. Schaffer, *Sec'y Dental Council*,
Harrisburg, Pa.

WEST VIRGINIA BOARD OF DENTAL EXAMINERS.

The West Virginia State Board of Dental Examiners will hold its annual meeting for examinations in Morgantown, W. Va., June 7, 8, and 9, 1905.

Applications should be filed with the secretary before June 1st. Application blanks and all necessary information will be furnished by the secretary.

H. M. Van Voorhis, *Sec'y*,
Morgantown, W. Va.

NEW HAMPSHIRE BOARD OF REGISTRATION IN DENTISTRY.

The New Hampshire Board of Registration in Dentistry will hold examination for candidates to practice dentistry, at the Manchester House, Manchester, N. H., June 13, 14, and 15, and December 12, 13, and 14, 1905.

A. J. Sawyer, *Sec'y*,
Manchester, N. H.

RHODE ISLAND BOARD OF REGISTRATION.

The next meeting of the Rhode Island Board of Registration in Dentistry for the examination of candidates will be held at the Statehouse, Providence, R. I., June 27, 28, and 29, 1905.

All applications, together with the fee of twenty dollars, must be in the hands of the secretary not later than June 20th.

W. S. Kenyon, *Sec'y*,
301 Westminster st., Providence, R. I.

MINNESOTA BOARD OF DENTAL EXAMINERS.

The Minnesota State Board of Dental Examiners will hold a special examination June 5, 6, and 7, 1905, in Minneapolis, at the Dental Department of the State University.

The secretary will be at the dental department on the afternoon of June 3rd to receive applications. All applications must be in by 5 p.m. of that date. Application blank will be furnished upon request, by

F. S. James, *Sec'y*,
Winona, Minn.

KENTUCKY BOARD OF DENTAL EXAMINERS.

The Kentucky State Board of Dental Examiners will meet for examination of candidates June 6, 1905, at the Gaulbut building, Louisville, commencing at 9 a.m. Candidates will be examined in the following subjects: Anatomy, physiology, materia medica, pathology, histology, operative dentistry, oral surgery, chemistry, metallurgy, and prosthetic dentistry.

A general average of seventy-five per cent. is required. Candidates must come prepared with instruments (except engine) and material (gold) to fill at least one tooth; also a metal case of not less than four teeth (bridge or plate) invested, and ready to solder before the board. Candidates will be required to certify that all work on metal case was done by them, and must be graduates of reputable dental colleges.

Application for examination must be made on blanks furnished by secretary, and must be accompanied by a fee of $20.00.

C. R. Shacklette, *Sec'y*,
628½ Fourth ave., Louisville, Ky.

WISCONSIN BOARD OF DENTAL EXAMINERS.

The next meeting of the Wisconsin State Board of Dental Examiners for examination of candidates for license to practice dentistry in Wisconsin will be held in Milwaukee, June 26, 1905, at the Wisconsin College of Physicians and Surgeons, corner Fourth st. and Reservoir ave.

Application must be made to the secretary fifteen days previous to the examination. The candidate must be a graduate of a reputable dental college, or have been engaged in the reputable practice of dentistry consecutively for four years, or an apprentice to a dentist engaged in the reputable practice of dentistry for five years.

For further particulars apply to

J. J. Wright, *Sec'y*,
1218 Wells Bldg., Milwaukee, Wis.

DENTAL EXAMINERS OF THE DISTRICT OF COLUMBIA.

The semi-annual examination of the Board of Dental Examiners of the District of Columbia will be held July 5, 6, and 7, 1905.

All applications for examination must be accompanied by a fee of ten dollars, and should be filed with

Sheldon G. Davis, *Sec'y*,
607 Thirteenth st., Washington, D. C.

SOUTH DAKOTA BOARD OF DENTAL EXAMINERS.

THE next meeting of the South Dakota State Board of Dental Examiners will be held at Mitchell, S. D., July 11, 1905, beginning at 1.30 P.M.

All candidates will be required to perform practical work in both operative and prosthetic dentistry, and should bring all instruments and materials necessary. Vulcanizer, lathe, and swaging appliances will be furnished by the Board. Application, together with fee of ten dollars, must positively be in the hands of the secretary before July 7th.

G. W. COLLINS, *Sec'y*,
Vermillion, S. D.

VERMONT BOARD OF DENTAL EXAMINERS.

THE next meeting of the Vermont Board of Dental Examiners for the examination of candidates to practice dentistry will be held at Montpelier, July 5, 6, and 7, 1905, commencing at 2 P.M. on the 5th. Headquarters will be at the Pavilion Hotel.

All applications, together with the fee of twenty-five dollars, must be in the hands of the secretary not later than June 25th. For information apply to

GEO. F. CHENEY, *Sec'y*,
St. Johnsbury, Vt.

NEW JERSEY BOARD OF REGISTRATION.

THE New Jersey State Board of Registration and Examination in Dentistry will hold its semi-annual examination in the theoretical branches in the assembly chamber of the Statehouse at Trenton, N. J., July 11, 12, and 13, 1905. Practical prosthetic work will be done at the office of A. Irwin, 425 Cooper st., Camden, N. J.; practical operative work at the office of Charles A. Stockton, 22 Central ave., Newark, N. J.

All applications must be in the hands of the secretary ten days prior to the examination. Fee for examination $25.00.

For information apply to

CHAS. A. MEEKER, *Sec'y*,
29 Fulton st., Newark, N. J.

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING MARCH 1905.

March 7.

No. 784,060, to JEAN P. MATHERET. Process of manufacturing dental plates.

No. 784,098, to WALTER S. BEAZLEY. Dental root-extractor.

March 14.

No. 785,018, to IRA P. NORTON. Dental forceps.

March 21.

No. 785,529, to CHARLES A. THOMSON. Dental jaw brace.

No. 785,548, to AARON P. GOULD. Dental chair.

No. 785,619, to CLOSSON M. LEFFINGWELL. Dental matrix retainer.

March 28.

No. 785,715, to FREDERIC A. J. COURNAND. Manufacture of artificial teeth or the like.

No. 785,788, to RAIMUND ZENTNER. Dental tool.

No. 785,904, to ANDREW MAY. Waxing-up tool for dental trial plates.

No. 785,992, to GEORGE H. WHITELEY. Shade guide for artificial teeth.

No. 785,993, to GEORGE H. WHITELEY. Mold for artificial teeth.

No. 785,999, to SAMUEL S. BLOOM. Connection for artificial teeth and dental plates.

THE

DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

PRINCIPLES AND TECHNIC OF RETENTION IN ORTHODONTIA.

By CALVIN S. CASE, D.D.S., M.D., Chicago, Ill.

(Read before Section VI, Fourth International Dental Congress, St. Louis, Mo., August 30, 1904.)

PRINCIPLES OF RETENTION IN ORTHODONTIA.

IN the application of modern methods for the correction of malposed teeth considerable satisfaction is experienced by the dentist in his ability to move the teeth to the desired positions and attitudes. But when it comes to that branch of the operation which pertains to the permanent retention of corrected teeth for future use and beauty, it is quite often a very different story; and so when you see or hear expressed the opinion that this important and indispensable branch of the operation of regulating teeth can always be easily and surely accomplished with very simple appliances, or that it is one which does not at times demand the highest order of skill and judgment, or "that teeth regulated according to the principles of normal occlusion, without extraction, never fail in permanence of retention whatever the cause of irregularity," you will not be far wrong if you conclude that the orator is a man of either limited experience or one given to delusive expressions. These opinions may be partly due to the fact that most teachers of orthodontia treat this branch far more lightly and inadequately than it deserves.

In my opinion it is so far-reaching in detail of conditions and methods as to make it impossible in a single society paper to mention more than the most salient features which practically relate to the underlying principles of the art. These may be divided into: (1) Influences of inheritance. (2) Influences of physical relations before and after correction. (3) Principles of retaining appliances and the technics of construction and application.

INFLUENCE OF INHERITANCE. The inheritance of any family type of irregularity, from that of a single malturned incisor to excessive protrusions and retrusions, will be found difficult and in some instances impossible to retain in corrected positions without a permanently attached fixture.

The longer I practice orthodontia, the more respect I have for the general teachings enunciated twenty-five years ago and more, and published in that inestimable work entitled "Oral Deformities," by our grand old man of orthodontia, Norman W. Kingsley. While the implements and appliances used for retention in those days were very crude as compared to those of the present time, the difficulties arising in certain conditions and the influences of natural laws remain the same, and continue to engage our most earnest endeavors and often futile attempts at permanence of retention, even with the most perfectly constructed modern appliances. Dr. Kingsley expressed thousands of ideas that are as true and applicable today as when first written. Indeed, we continually see in print these and many time-worn important thoughts re-clothed and presented in a new and forceful light, and I am sorry to say, too often introduced and claimed as discoveries of modern origin. He sums up in the following words all that I would care to say relative to the influences of inheritance:

"In hereditary cases of extensive character which have been delayed until at or near maturity, we can never feel certain that the original tendency to malposition so long unbroken will not reassert itself at any time that we abandon retaining fixtures."

Physical relations. In regard to the second phase of my subject, *i.e.* the influences of physical relations before and after regulation, I cannot do better than quote Dr. Kingsley at some length:

"The occlusion of the teeth is a most potent factor in determining the stability in a new position.

"If occlusion of the teeth will be such as to favor the retention of moved teeth in their new position, then considerable movement may be attempted at almost any age at which it might be desired, and with an expectation of success; but if, on the other hand, the occlusion would be bad, with a tendency to drive them to their former positions, then all efforts at regulating would be folly at any age.

"Teeth could only be retained in changed positions under such circumstances by constantly wearing fixtures which would jeopardize their durability and permanence. The wearing of retaining plates as well as all other fixtures upon the teeth is undesirable and objectionable; they are an evil, necessary in some cases, but to be avoided as much as possible. Nevertheless, the fruits of a skilful and successful effort in regulating teeth must not be lost by neglecting to retain them in place until they not only become firm, but the tendency to return to their former positions has been seemingly overcome."

Dr. Edward H. Angle, in his work entitled "Malocclusion of the Teeth and Fractures of the Maxillæ," has also expressed many valuable thoughts relative to the principles of retention, which are worthy the careful study of all who essay the regulation of teeth. A small part of this teaching is as follows:

"It should ever be borne in mind that unless the conditions which have been operative in producing or maintaining malocclusion be removed or modified, the establishing of permanent normal occlusion can rarely be hoped for. For example, if the arches have been narrowed and the teeth forced to take malpositions as a result of mouth-breathing due to pathological conditions of the nasal passages, it will be very improbable that the teeth remain in correct occlusion after removal of the retaining device, regardless of the time it may have been worn, unless normal breathing be established, so that the mouth may be closed and the teeth not deprived of occlusion and the normal restraint and support of the lips, the requisite amount of time.

"Again, if irregularities of the upper teeth have followed as a result of the diminished size of the lower arch, from an overlapped or irregular condition of the lower teeth, it would be folly to expect the teeth of the upper arch to be permanently maintained in their new positions unless occlusion be established by harmonizing the proportionate sizes of

the arches by correction of the positions of the lower teeth."

I would add to this paragraph another too frequent and deplorable cause of a diminution in the size of an arch that would otherwise be harmonious in its mature relations, *i.e.* that of injudicious extraction of one or more temporary or permanent teeth with the view of correcting a decided malalignment that is mainly due to the undeveloped size of the jaw, and under the mistaken impression that the teeth will not or cannot be otherwise corrected, or even to facilitate correction that would otherwise involve greater difficulties, time, etc.

One of the greatest harms in this sort of malpractice arises from the fact that a contracted arch, caused by the loss of any of the permanent teeth, that would otherwise be harmonious in its relations will almost invariably produce an irregularity of opposing teeth, which if corrected will be found impossible to retain unless either an equal number of teeth have been extracted to harmonize relations in size and occlusion, or the contracted arch enlarged and supported with an artificial denture.

In the discussion of a paper which I presented at the last meeting of The Institute of Dental Pedagogics, and published in the July *Items of Interest,* I expressed the following relative to this subject:

"In the correction of all irregularities with the view of their permanent retention, occlusion is one of the most important factors for consideration in diagnosis and prognosis.

"In every case where the masticating teeth have established a fixed occluding position with cusps that interlock or interdigitate, whether it be typically normal in its relation or not, any change of that position necessary for the accomplishment of correction should place them in a new occlusal position of self-fixation, else Nature, either in her forceful efforts to perfect the function of mastication, or in response to the laws of inheritance, will mar or wholly destroy the perfect results of treatment, even though the teeth be artificially retained for years.

"In cases where one or more teeth are crowded out of arch alignment, or are malturned or overlapping, if held in that position by the fixed occlusion of other teeth, any movement to accommodate them that is destined to affect the relative positions of the bicuspids or molars will usually require a concomitant movement of the occluding teeth of the opposing jaw."

While a normal occlusion of the teeth is eminently to be desired and striven for in regulation, if for no other reason than the aid it affords to retention, we should not forget that it is somewhat rare to find an anatomically normal occlusion among natural dentures which we even consider regular. But what we do almost invariably find in all cases that are not open-bite occlusions is that the masticating forces have caused the teeth to adjust themselves so that the cusps of one set are fitted into the depressions and sulci of the other with considerable accuracy, showing that this relation, whether by a typically normal occlusion or not, must be attained, else Nature will attain it before she rests; nor can permanence of retention of the masticating teeth be assured before. In other words, a malocclusion is nearly, if not quite, as capable of fixing and retaining the relative positions of teeth as a normal occlusion when the requisite interdigitation of the cusps has been attained. Then arises the question as to the influence which a possible change in these teeth will exert upon the corrected front teeth toward crowding them forward to their former overlapping or protruded malpositions, or *vice versa;* for, after all, the principal object of the work is to secure a permanent esthetic relation of the front teeth. It is only in rare cases that we can hope to actually improve the masticating function of a fixed occlusion of even quite irregular teeth.

There are many instances of irregularity for which esthetic relations cannot be perfectly attained without extraction; nor can that which it is possible at times

to attain without extraction be retained with the same assurance of permanence, because of the forceful tendencies of crowded buccal teeth to assume their former positions.

I refer to excessive protrusion of the upper or lower teeth, with the teeth of the opposing jaw in normal dento-facial relations; also to full protrusions of the upper and lower teeth.

In the cases to which I refer, correction without extraction would mean that all of the teeth of the protruded arch or arches would require to be moved back fully the width of a bicuspid. While I will admit that it would be possible to move the buccal teeth of the upper jaw distally that distance, with a long-continued and heroic application of the occipital and intermaxillary forces for patients even as old as twelve or thirteen years, the same amount of movement would not be possible with the lowers because of the impossibility of applying the occipital force; and for full protrusions, of applying to the lower either the occipital or the intermaxillary forces. And in any event, with molars that had naturally erupted in that position—or, in other words, which had not drifted mesially because of the premature loss of deciduous teeth—such an extensive movement would in all probability produce a decided distal inclination of the crowns, with no perfect occlusion, thus robbing the operation of its principal if not only element of retention; while the tipped occlusal planes would constantly tend to force the teeth back to their former positions; and, further, permanence of retention would still not be assured without the ultimate extraction of the third molars. And so, after all, this prolonged and questionable operation to satisfy a sentiment resolves itself into the question whether it is better to extract a bicuspid on each side followed by ease of correction and assurance of retention, than subject the patient and operator to far greater difficulties, with questionable possibilities of retention and the final extraction of the third molar.

Narrow upper arches with high domes, protruded V-shaped labial curves, with the buccal cusps occluding in the sulci of the lowers instead of on the buccal aspect, and the upper buccal teeth not lingually inclined are not uncommon, and usually are caused by a lack of proper development of the maxillary bones due to early diseases in the maxillary and nasal sinuses, adenoid vegetations, degeneracy, etc. As Dr. Angle has pointed out, correction would be futile without a removal of the cause. There is another equally important requirement which pertains directly to retention, *i.e.* proper means should be adopted to produce a *bodily* lateral expansion.

If lateral inclination movement of the crowns alone is produced, as would probably occur from an expanding jack as it is ordinarily applied, the occlusal planes would be so abnormally tipped that perfect occlusion could not be possible, while the main object of the operation would be so uncompleted that permanence of retention would be doubtful.

I might also add to this theme the teachings of those eminent writers and authors of text-books, Drs. Farrar, Guilford, Bogue, Goddard, and others on this side and across the water, to further show that all men of large experience in orthodontia recognize and lay special stress upon the importance of the influences of inheritance and occlusion, in considering the permanent retention of regulated teeth.

Beyond this I shall not attempt an outline of the various causes which operate to destroy the retention of moved teeth, nor describe in detail the imperfections and inadequacies of retaining plates and fixtures that have been and are still being used. There are, however, certain underlying principles that should be borne in mind:

First: Teeth that are moved by orthopedic processes from one relative position to another are for a considerable time—often for years—subjected to the physical forces of surrounding tissues, which tend to move them back toward the irregular positions they formerly occupied.

Second: These forces continue to operate until the stretched and bent fibrous structures are brought to equilibrium in their changed positions by the physiological processes of Nature. To most successfully aid Nature in the upbuilding of sustaining elements and structures, the moved and loosened teeth should be held relatively still during the entire period that is required for their permanent retention.

Third: A somewhat proportionate relation will be found to exist between the character of the forces required for movement and the reactive forces opposed to retention. In other words, if the movement will have required considerable force, the retaining fixtures will need to be of proportionate strength and stability, unless the teeth are brought to positions of positive self-fixation by occlusion. Again, the reaction will always be along the lines in the opposite direction to that of the movements—either rotation, inclination, bodily, or a compound of these three elementary movements—consequently the fixture should be so constructed and applied to completely overcome these reactive tendencies.

Fourth: As a rule, teeth that have been moved slightly are far more difficult to retain than those of extensive movements, because—as in ethical relations—ties of attachment that are slightly strained are far more liable to regain their former relations than if completely broken up. Adult patients frequently apply for treatment with no more than slight malturned lateral incisors, under the impression that successful correction can be easily and inexpensively accomplished, but which more often than otherwise will demand a permanent fixture to retain them. In these cases the movement should be carried considerably beyond the required position in order to sever as much as possible the original attachments, and then allowed to slowly return to nearly the required position, when the retainer is attached.

Fifth: Teeth that have been moved slowly will not require the same strength of artificial retention nor the same length of time as those that are moved rapidly, because Nature has had time to partially complete the upbuilding elements of retaining bone structure.

Sixth: While it is a fact that teeth regulated during youth are more easily retained than if regulated at maturity or later in life, no rule can be laid down as to the time retaining appliances should be worn proportionate to age, so varied are the conditions and influences that obtain with different patients. In nearly all cases where the teeth do not receive the positive self-retaining support of occlusion, I require that the fixture be worn at least two years. During this time it should be removed as often as there is any doubt of the slightest imperfection in its cement attachments to the teeth, etc.

PRINCIPLES AND TECHNIC OF RETAINING FIXTURES.

To render the most aid in the upbuilding of tissues for the permanent retention of regulated teeth, the retaining fixture should be one that so firmly grasps the teeth that the several opposing forces are not only completely held at bay, but relatively lateral movements occasioned by mastication, etc., are prevented.

Anything in the form of a retaining plate which requires frequent removals for cleansing is objectionable, and far inferior to a cement-attached appliance for holding the teeth firmly in the desired positions.

The fixture should be as perfectly fitted, finished, and cemented to the teeth as a bridge denture, and so constructed that the teeth and gums can be kept in a healthy condition, while it is worn with the same comfort and unconsciousness that a filling or artificial crown produces.

To fulfill these demands, its appearance in the mouth is of the utmost importance. Patients and relatives will submit to long, tedious, and painful operations, often with cumbersome and unsightly apparatus, stimulated by the hope of ultimate success, but when the teeth are finally brought to a satisfactory position they naturally object to the long and

continuous use of any form of appliance objectionably conspicuous or annoying.

One of the greatest objections to an attached fixture is the danger from decaying detritus lodged in the pockets of imperfectly cemented bands and uncemented extensions. To avoid this the appliance should be carefully examined at least once a month, and removed upon the slightest indication of any imperfection in its cement fittings. The teeth should then be perfectly cleaned; the appliance cleansed, replated, and recemented. A retaining appliance that is properly constructed and attached may be worn without removal from six to twelve months, and occasionally longer.

Uncemented extensions, such as flattened wires soldered or attached to bands and lying upon adjoining teeth, are objectionable.

I prefer to make all bands and extensions that are exposed, of gold alloyed with platinum. For exposed bands I use B. and W. gold, sold by The S. S. White Dental Mfg. Co., which I am told is coin gold alloyed with platinum. The bands vary in thickness from Nos. 39 to 36. For intervening bands whose exposed surfaces are cut away and the balance of the band completely covered with gold in the process of construction, I use German silver No. 40.

It is eminently desirable to use bands as thin as strength will permit, in order to leave the smallest possible spaces at contact points while the appliance is in position and after its removal. Also to trim or cut away all portions of the fronts of bands, for the sake of appearance, that are not absolutely required for retention.

For extensions, I use clasp metal D wire No. 19, and for lingual reinforcements, clasp metal plate No. 28.

To illustrate the principles I have outlined, we will first consider a simple irregularity. (See Fig. 1.)

Fig. 2 is the common retaining fixture, which consists of a bar passed through a rotating tube attachment, or soldered directly to the band. This fixture can be made less irritating to the lips and more inconspicuous and permanent by bending a D clasp metal wire to conform to the labial surfaces, and soldering it to a perfectly fitted B. and W. gold band No. 38. The labial borders of the band are then trimmed nearly to the wire, and the whole perfectly finished and plated. (See Fig. 3.) The uncemented extensions which lie upon the adjoining teeth should be slightly convex on the under side and perfectly finished, and the patient required to frequently clean them with floss silk.

Fig. 1.



Fig. 2.

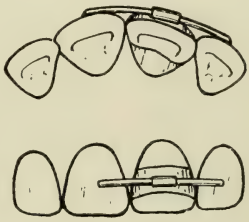
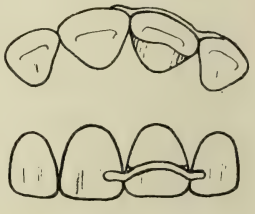


Fig. 3.

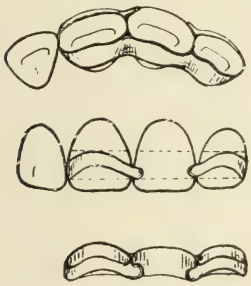


As uncemented extensions are at best often dangerous to the enamel upon which they rest, for young and somewhat careless patients I prefer the appliance shown in Fig. 4. The outer bands are gold No. 38, with joint on the lingual aspect, and the intervening band, German silver No. 40, with joint on the labial. I usually cut the outer or pier bands somewhat after the pattern that will be described for the canines, but of course according to the size of the teeth. (See Fig. 10.) The bands are carefully fitted and burnished to the inequalities of the lingual surfaces, and a partial impression is taken, using only sufficient plaster to submerge the bands. The bands are carefully removed from the

teeth with the removing pliers, and accurately placed in their respective positions in the impression, and their inner surfaces luted with a thin solution of plumbago—*but not between the approximal surfaces*—to prevent the flow of solder. The plumbago may also be flowed over the plaster for the purpose of separating.

The impression is now filled with investing plaster, and the model, with the

Fig. 4.



bands in place, is trimmed to a minimum size of stability for soldering. A small appliance of this character will usually require no lingual re-enforcement plate.

Commencing on the lingual side the solder, No. 20 gold, which unites the bands is caused to flow somewhat over the lingual surfaces to stiffen them. The model is then turned and small pieces of B. and W. gold are placed over the contact points and extended out upon the German silver band to form a nucleus

Fig. 5



for the flow of solder to cover the final labial extensions.

In finishing, the lingual face of the intervening German silver band is cut away, leaving only the labial extensions. All thickened interproximal portions immediately rootwise from the contact points should be ultimately removed.

The important feature in this character of an appliance lies in the fact that every part in contact with enamel is perfectly fitted and securely cemented, thereby insuring stability of position and immunity from harm so long as the cement attachments remain perfect.

In Fig. 5 both laterals are malturned.

Fig. 6.

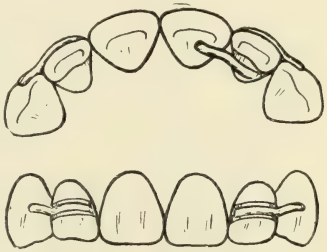
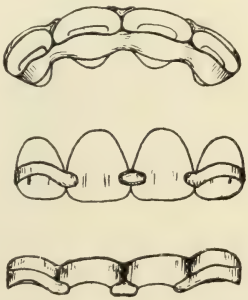


Fig. 6 shows an improvement over the bar attachment that is commonly recommended. In construction it is similar to Fig. 3.

Fig. 7 shows the appliance I would advise, which is constructed similar to Fig. 4. It will be found equally applicable where all of the incisors are malturned, but in alignment with canines that are properly posed.

Fig. 7.



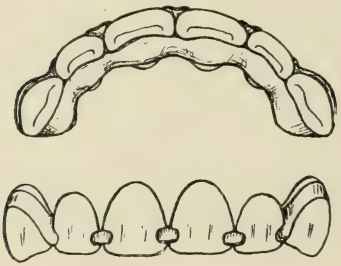
In a large proportion of irregularities all of the labial teeth are more or less malposed or require to be moved to bring about a proper arch alignment and occlusal relation.

Fig. 8, which includes the canines, is very similar in construction to the appliance last described. This was first published in the *Ohio Dental Journal,* January 1898, and represents the standard

retaining appliance which I have successfully used in my practice for hundreds of cases for the last ten years.

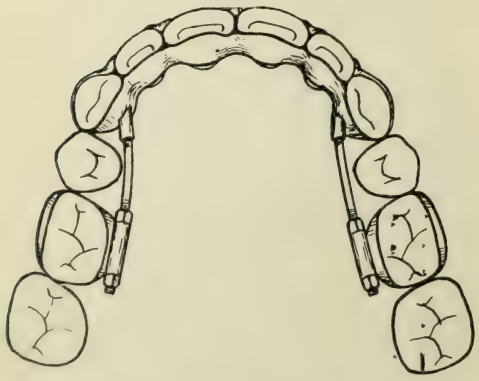
I have found that by holding the labial teeth firmly in their relations to each other they rarely move in phalanx, even after the correction of quite decided protrusions or retrusions.

Fig. 8



Again, after the correction of a narrow V-shaped arch by preventing the labial teeth from reacting, the bicuspids and even the molars rarely move though not otherwise sustained. In cases of decided protrusions and retrusions, however, and particularly when the incisors have been moved bodily in phalanx, provision is always made for lingual bars to the molars to overcome the tendency toward reaction. (See Fig. 9.) The figure

Fig. 9.



represents the retainer, which in my practice invariably follows the contouring apparatus where great rigidity of the bars is demanded to prevent the reaction of moved roots.

The bars are extra hard German silver wire No. 16, screwed into heavy internally threaded tubes, soldered to the labial surface of the appliance. To solder the bars directly would soften them, and possibly abort the object.

When the retainer follows the ordinary protrusions, where bicuspids have been extracted or otherwise, it is provided with short tube attachments soldered to the extreme linguo-distal borders, into which No. 19 bars may be hooked, if found needed, to extend to the molars, as shown.

Unless this labial retainer can be constructed with the same skill required for crown or bridge dentures it had better not be attempted, because it will fall short of its desired object, and may easily result in a thing which cannot even be placed on the teeth; or one which, if attached, will not hold the teeth firmly; or in itself force them to irregular positions.

Long experience in its use has taught me the importance of certain exact requirements in its construction which, if followed, will result in an appliance that will fulfill every demand and one, moreover, which the most fastidious patient will not object to wear the required time.

When the teeth are in correct positions, after extensive movements, no force should be exerted through the medium of the regulating apparatus for a week or two except that which may be accomplished with light silk ligatures to hold the teeth or slightly true them up.

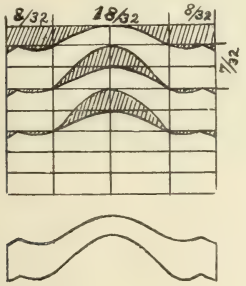
As it is always desirable to place the retainer the same day that the apparatus is removed, an early appointment is made in order to have plenty of time; though in an expert handling of the work two and sometimes three of these appliances can be made and placed in one day. When a six-band appliance is first placed it is not cemented, but allowed to remain about one week upon the teeth, that they may become adjusted to it and facilitate a quick placing, required by the setting cement.

When the regulating apparatus is removed, the teeth are cleaned of cement, etc., and the retainer bands fitted, as described.

In order that the canine bands—which are the only ones when finished that encircle the teeth—shall be as inconspicuous as possible, they are cut from a pattern which provides for a wide lingual portion with joint, and a narrow labial portion, which conforms to the gingival line. When properly soldered, fitted, and contoured, this pattern will be found to perfectly fit every canine.

A piece of No. 36 B. and W. gold, one and one-sixteenth of an inch wide, is annealed, and marked as shown by the straight lines in Fig. 10. A little prac-

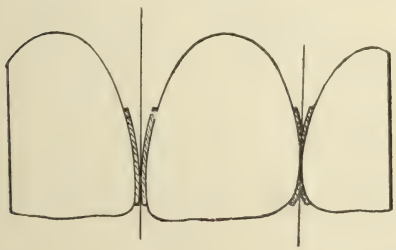
Fig. 10.



tice will enable one with a delicate pair of curved manicure scissors to cut the pattern band shown in the lower part of the figure.

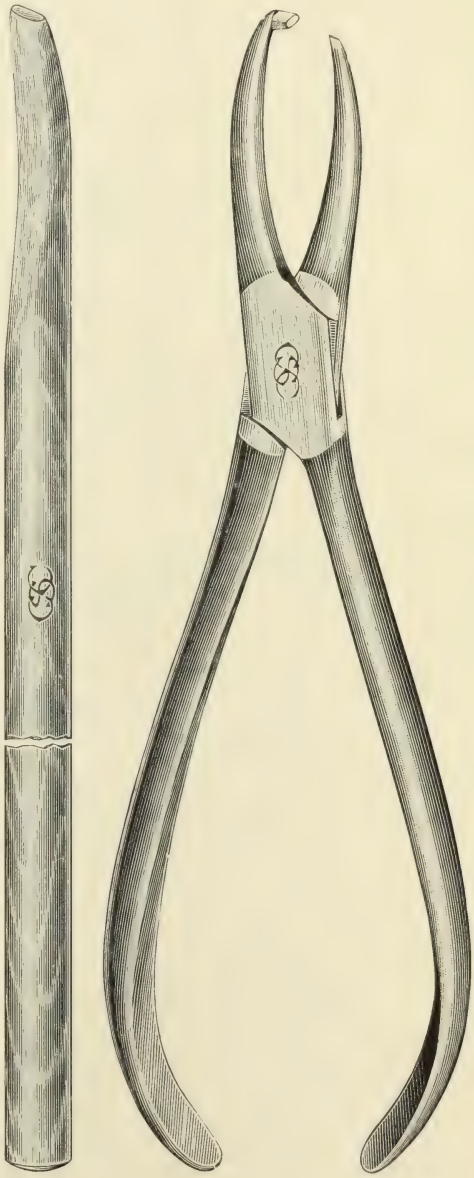
The thickness of this band (.0045) with that of the adjoining one (.003) will produce about as much space between the canine and lateral as would be caused by two layers of common writing paper; and this can be reduced at the contact point, if desired, with a paper disk, as shown in Fig. 11.

Fig. 11.



The incisor bands are No. 40 German silver, and sufficiently wide to reach the interproximal gingivæ. There is not much use in trying to fit a thin wide band that requires forcing on and off the teeth several times, without proper

Fig. A. Fig. B.



tools, *i.e.* a hardwood plugger with end large enough to cover a considerable portion of the edge of the band, and a pair of specially constructed band-removing

pliers, the extreme end of one of its beaks being turned at right angles and shoed with copper, or some soft metal, to safely act as a fulcrum resting upon the incisal edges or occlusal surfaces. (See Figs. A and B.)

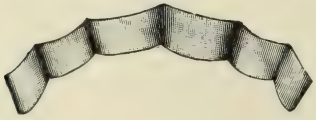
When the bands are placed, an impres-

Fig. C.



sion is taken in investing plaster, and treated as described. (Fig. F.) In separating, the lingual portion of the impression is saved (see Fig. C), from which to obtain the die for swaging the lingual reinforcement piece of Nos. 30 or

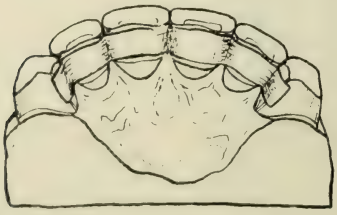
Fig. D.



28 clasp metal plate to stiffen the appliance. (See Figs. D and E.)

The general flare of the labial teeth often occasions considerable difficulty and pain in placing the appliance when finished. This has been one of the

Fig. E.



greatest drawbacks to its general adoption, though much has been due to the lack of perfect accuracy and care in its construction.

It will usually be impossible to place the appliance upon the teeth for the first time, if started with the canines. It should be started at the median space; then the laterals, and, finally, the canines. When it is forced to a starting position upon all of the teeth, it can then be easily malleted to place with the wood-plugger.

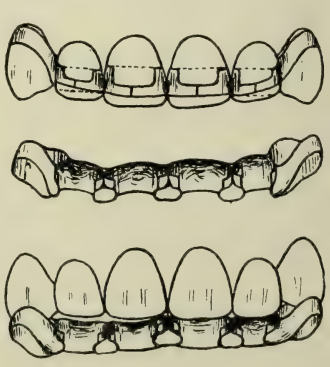
To facilitate starting the appliance at the median space, etc., in the preliminary fitting of the bands the interproximal

Fig. F.



portions of the incisor bands are left the full width to act as entering wedges in the first placing; the bands being otherwise trimmed, as shown in the upper part of Fig. 12.

Fig. 12.



In fact it is often desirable to have the approximal entering extensions, for the *first* placing, much wider than those shown in Fig. 12. This may be accomplished by having alternate incisor bands wider. As will be explained, these are cut away in the *final* placing of the appliance.

To prevent the solder from producing

thickened portions in the interproximal spaces above the contact point and thus abort their object, the interproximate extensions are pressed closely together *before* filling the impression with the bands in place. (See Fig. F.) Another important move at this time is to burnish the gingivo-lingual edge of the band firmly against and slightly into the plaster impression, as it is liable to slightly contract in soldering, and thus strike the lingual edge before it should, in placing the appliance. After soldering, the approximal extensions are filed to a knife-blade edge.

The middle and lower sections of Fig. 12 show the appliance unfinished, with the approximal guide extensions ready for the first placing. In the final placing and cementing these are cut down and finished to the contact point extensions that are covered completely with gold, as shown in the lower drawing of Fig. 8.

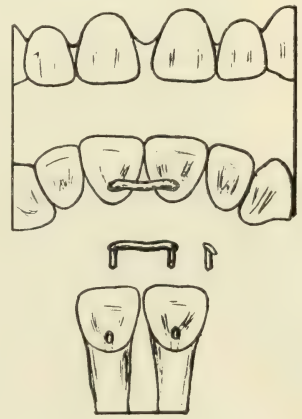
After a six-band appliance of this character is finished, it will at times seem to be impossible to place over the flare of the labial teeth, whereas the same appliance might be readily placed by the hands of an expert. However, when it seems to be absolutely impossible to place the appliance, as sometimes occurs, there is no objection to sawing it in two, through the lingual section of one of the centrals, which will enable a temporary placing of the appliance for a few days, when an impression is taken, etc., as described, and the cut surfaces soldered. The teeth, in the meantime, will have become so adjusted, that a second temporary placing will be possible, preparatory to the final cementing.

It will be understood that this appliance is quite as applicable for the lower teeth.

When the upper or lower buccal teeth are moved distally, mesially or reciprocally with the intermaxillary elastics, or the labial teeth are extruded to correct open-bite occlusions, provisions are made for a continuation of a moderate degree of this force; the details of which will hardly permit me to explain at this time.

The subject of retention would not be complete without mentioning a permanent retaining appliance that is especially adapted to follow the correction of that somewhat common irregularity that is characterized by abnormally wide interproximal spaces, usually between the central incisors and commonly caused by a close-bite incisal occlusion which is increased later in life by the wearing away of masticating surfaces. (See Fig. 13.)

Fig. 13.



This retainer with full description of its construction and application was presented at the Odontological Society of Chicago, April 1903, and published in the *Dental Review,* February 1904.

It essentially consists, when finished and in place, of a close-lying bar that extends from one linguo-gingival ridge to the other. The ends of the bar are turned at right angles to enter pits bored in the teeth, in which they are firmly cemented.

I regret that the length of my paper will not permit a fuller description of this valuable appliance and the technic of its construction. While I have at present used it only for the above-mentioned cases, I have no doubt of the practicability of this principle, with slight variations in its construction, for more extensive irregularities and also for the permanent retention of pyorrhea-loosened teeth.

DISPROPORTION IN THE DIMENSIONAL RELATIONS OF THE TEETH AND JAWS: A STUDY IN COMPARATIVE ANATOMY.

By WM. BEBB, D.D.S., Los Angeles, Cal.

IN the November number of the Cosmos, Dr. Norman G. Reoch, in an article entitled "The Fundamental Principles of Orthodontia," makes this statement: "It seems to me that it is time that old fossilized theory of small jaws and large teeth be exploded."

This expression, or one cast in the same mold, appears so frequently in the writings of the authors belonging to the "new school of orthodontia" as to lead one to infer that it is one of the established articles of their creed.

If by the expression they mean only to censure that class of general practitioners who, for lack of better education, use the term to justify extraction for correction of malocclusion of the teeth where such procedure is decidedly contraindicated, and permanent irreparable injury is done to the patient thereby, then I say amen; for I, too, believe it is high time that that class of operators be shown the folly of their teachings and the error of their ways; but if the assertion is made to be accepted literally, as embodying a scientific fact, that there exists no such thing as large jaws and small teeth, and large teeth and small jaws, then I take exception.

FIG. 1.



Gray Wolf.

In this age and day few people doubt the essential truth of the theory of evolution, the doctrine of "natural selection," or the principles laid down by Darwin in his chapter on "Variation Under Domestication."

If we do accept these theories, if we believe that evolution is founded upon variation, and that the greatest variations occur in plants and animals under domestication, then we must admit that there frequently occurs in the arrangement of the human teeth, in proportion to the supporting tissue, slight variations, and if there exist variations in a slight degree, why not in a greater one,

and why may we not have large teeth and small jaws?

Variations occur in much greater degree than is generally supposed, "often reaching 20 per cent. of the part implicated, and this without reference to the general size of the animal."* (Wallace on Darwinism.)

Some time ago I undertook the measurement of jaws of human crania in order to arrive, if possible, at some definite basis by which one could determine the relative amount of tooth-substance as compared to the size of the maxillæ, but the hopelessness of the task soon influenced me to abandon it. However, the few cases I examined revealed an amount of tooth-substance obtained by measuring each individual tooth between contact points and adding these results from the central incisors to the third molars of from 60 to 70 mm.; while single bicuspids varied from 5 to 8 mm., and molars from 9 to 13 mm.

A bicuspid 8 mm. in diameter as compared with the smallest amount of tooth-substance in a single maxilla of 60.5 mm. is 13.2 per cent. A molar 13 mm. in the same arch is 21.3 per cent.

Now, suppose we had "a variation of 20 per cent. in the part implicated, without reference to the size of the animal," or a mandible and teeth 20 per cent. larger than the general size of the cranium, would it not be possible and indicated for the correction thereof, to ex-

FIG. 2.



Coyote.

FIG. 3.



Bull Terrier.

* Tomes, "Dental Anatomy," p. 265.

tract therefrom a bicuspid 8 mm. in diameter, or 13.2 per cent. of the whole (an unusually large percentage), and still have 6.8 per cent. of space left over? Or a molar 12 mm. wide, and then have a variance of only 1.03 per cent. the other way?

If, for comparison, we could produce a type specimen of a skull from which man has descended, it would be impossible to find among living subjects a single specimen involving the teeth, not in malocclusion but comparative size of the teeth and mandibles, in which there was not a deviation from the normal, and which no amount of mechanical procedure could restore to the normal. At the same time I believe there exists but a small percentage of cases where the variation is so great as to warrant the extraction of a bicuspid fully 7 mm. in width between contact points, or a molar 11 or 12 mm., to correct the same.

The accompanying illustrations present conditions which, while they are by no means conclusive, are an argument in favor of the existence of small jaws and large teeth.

I have measured the mandibles of many wild and domestic Canidæ, taking as my base a line drawn from the distal margin of the alveoli of the central incisors to an intersecting line drawn from the distal surfaces of the last molars.

These, with the total tooth-substance as represented by the premolars and molars, measured in their greatest diameter, are the measurements upon which the arguments advanced in this article are based.

In making selections for these illustrations I have avoided those specimens which were in any way extreme, except that of Fig. 1, which is from a skull of *Canis occidentalis* (gray wolf) and the largest specimen from my collection of nineteen wild Canidæ. The others are all average specimens.

I ask the reader to grant that the bull terrier, bulldog, and mastiff descended from the gray wolf.

FIG. 4.



Bulldog.

This concession may be reluctantly made, because the probability that they did so is remote.

While some of our domestic animals have been traced to one wild ancestor, we are reasonably sure that the domestic dog had several.

Native tribes, with their fondness for taming wild animals, domesticated the wild Canidæ found in the country over which they roamed, and the ancestry of our domestic dogs of today can undoubtedly be traced to several of these progenitors.

However, there being no counterpart of the bulldog found among the prehistoric or early specimens of the Canidæ, it is highly probable that they are the result of selection by man, and I have no doubt that the wild ancestor of the domestic animals I offer was a less

powerful animal than the one which I give for comparison.

In fact, the bulldog from which the skull illustrated was taken was an animal slightly greater in proportions than that from which Fig. 2, a specimen of *Canis ochropus* (California coyote) belonged; one which I trapped myself has a mandible measurement of 97 mm., with a tooth-substance of 69.5 mm.

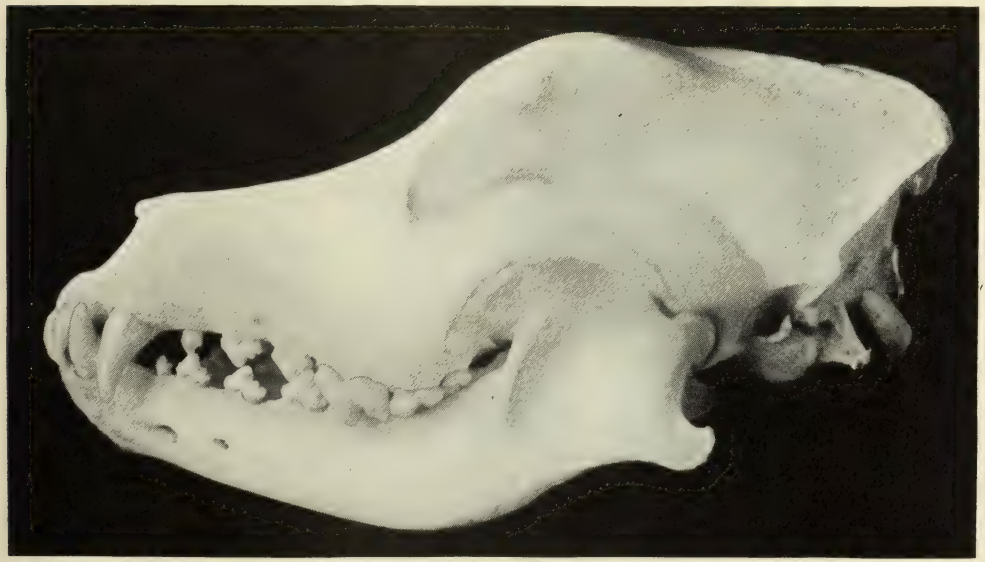
I believe it would be more just to compare the domestic dogs with this latter specimen, but for sake of argument I have selected, as I said before, the very largest wild Canidæ in my collection.

Applying the above method of measurement to this specimen, we find it has a mandible of 103 mm., with a total premolar and molar tooth-substance of 80 mm.

The illustration Fig. 3 is of a bull terrier. Here may be observed the result of domestication.

The frontal bone becomes more prominent, the maxilla shortened until there is a slight protrusion of the lower anterior teeth. Both arches, upper and lower, are expanded with the teeth somewhat irregular in arrangement. The mandible measurement in this specimen is 85

FIG. 5.



Mastiff.

Fig. 1, *Canis occidentalis* (gray wolf) is an illustration, as will be seen by comparison with the other specimens, of a large and powerful animal.

The zygoma is thick, broad, and heavy, and the ridges are prominent for the attachment and support of the powerful muscles with which this animal is endowed. The jaws are long and in every way well formed, the teeth are well proportioned and symmetrically arranged—a typical dentition and articulation as represented by the wild Canidæ.

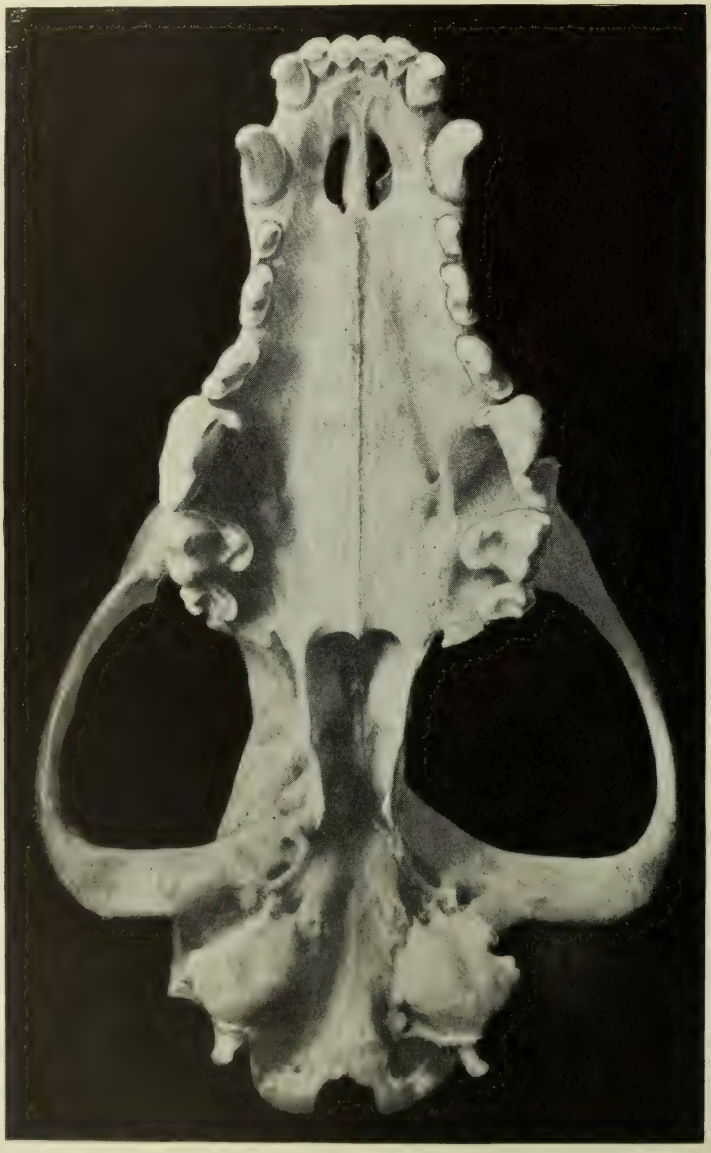
mm., a shortening from the wolf of 18 mm., while the total tooth-substance is 69 mm., a lessened amount of but 11 mm.

Observing Fig. 4, an illustration from a well-bred bulldog, a wide difference from the characteristics of the wolf is noticed, all due to "variations under domestication." The bones of the crania and face are both altered. The maxilla has been so shortened as to give a decided protrusion to the lower anterior teeth. The upper canine has been carried backward until it fails to come in

contact with the opposing canine, and thus has become more or less functionless. The maxilla is expanded and the teeth forced out of alignment and occlusion, while the mandible is forced to an abnormal curvature both from a lateral and vertical plane.

This crowded condition of the teeth can, I believe, be accounted for by the theory that bone is more subject to influence than the teeth, and that while the maxillary bones, by nature of their lack of density as compared with the teeth, have become much shortened, the teeth, being dense, non-elastic, and non-yielding, remain little changed.

Fig. 6.



Gray Wolf.

In this specimen we have a mandible measurement of 72 mm., containing 68.5 mm. of tooth-substance, a diminution from the gray wolf (Fig. 6) of the great amount in mandible measurement of 31 mm., while in tooth-substance there is a difference of only 11.5 mm.

Compared with *Canis ochropus,* the bulldog has 25 mm. less mandible and only 1 mm. less tooth-substance.

Again, in Fig. 5, the skull of a mastiff, we have a larger and more powerful animal than the wolf. The skull in every way is of greater proportions except the teeth.

The mandible measurement is 116.5 mm., an increase of 13.5 mm. above the wolf, while the tooth-substance remains exactly the same, or 80 mm.

If I interpret the orthodontists correctly, they would say the teeth of the bulldog are in perfect harmony with the supporting integument, only you must establish "normal occlusion" by mechanical procedure, protrude the jaws and contract the arches until the teeth occupy their normal position, such as the conditions were before man interfered.

The result would be what? A dog with body, limbs, crania all in good proportion, and with a long, narrow snout, like a wolf or coyote.

Shorten the mastiff's arches until this noble animal resembles an overgrown pug dog, and would you not arrive at the conditions which the orthodontists seek in the human?

Table of Measurements, in millimeters.

	Length of mandible.	Amount of tooth structure.
Gray wolf	103	80
Bulldog	72	68.5
Coyote	97	69.5
Bull terrier	85	69
Mastiff	116.5	80

THE STRESS OF DENTITION.

By EDWARD C. KIRK, D.D.S., Sc.D., Philadelphia, Pa.

(Read before the quarterly meeting of the Maryland State Dental Association, Baltimore, December 3, 1905.)

IN asking your attention to the question of pathological dentition, I am well aware that the subject is an old one—as old perhaps as any that has engaged the attention of writers upon dental subjects. From the earliest times to the present, pathological dentition has been a fruitful topic of discussion about which much controversy has been waged, and opinions have widely differed as to the part which the teething process may play in the production or the intensification of morbid processes in other parts of the body, or of the body as a whole.

The pendulum of opinion both medical and dental has swung from one extreme to the other in the consideration of this question, and even yet we do not find that any definite conclusion has been reached as to the rôle which the teething process may play in the production of pathological conditions. Certainly no solution of the question has met with general acceptance, and it may therefore be regarded as still open for investigation and debate.

In the dental profession, where a better and more accurate knowledge of the nervous relations of the teeth is a necessary part of professional training, the *rationale* of the process by which peripheral nervous irritation of dental origin can bring about functional derangement of other parts of the bodily economy is well understood. Among our medical brethren, whose training in dental pathology is usually so meager as to be practically

a negligible quantity, the belief that the teething process is not to any appreciable extent a causative factor in other bodily diseases quite frequently obtains.

The manner in which the teething process may set up peripheral nervous irritation with its train of morbid manifestations is sufficiently simple, and is doubtless well known to all in this audience. Yet simple as it is, the facts seem to have been overlooked or ignored by medical practitioners generally. Let me briefly restate the conditions involved in the initial lesion of the abnormal teething process, so that we may have them clearly before us. Under normal conditions the evolution of a tooth into its proper position in the alveolar arch depends upon a definite correspondence between the resorption of the overlying tissues of the crown and the development of the root by successive additions to its length. When this correspondence is lacking and the root-growth is more rapid than the resorption of the overlying tissues of the crown, impingement of the developing root upon its formative organ, the dentinal papilla, ensues, resulting in irritation of that sensitive and highly vascular organ. The irritation may increase until a traumatic inflammation of the papilla is set up and a true odontalgia is produced. We have then an irritation of the dental endings of the great fifth cranial nerve which is progressively increasing in its intensity, and where successive teeth are involved is continuous over a long period of time, even through the entire dentitional period.

It is surprising that this source of nervous irritation should be so frequently ignored or that its relation to other bodily ills that affect the teething infant should be lost sight of. The general principles underlying the production of reflex phenomena through peripheral irritation in infants and children are well understood, and medical text-books furnish many illustrative examples thereof. Intestinal parasites and irritating or indigestible substances taken into the stomach are fruitful sources of reflex nervous and functional disturbances which are familiar to all. And yet the equally palpable conditions found in pathological tooth-evolution are all too frequently regarded by physicians as having no bearing upon certain morbid phenomena which more careful investigation would show to be sequelæ of the abnormal teething process. It has been contended that dentition is a physiological process just as gestation and parturition are physiological processes, therefore there can be no morbid phenomena associated with dentition. But all of these processes are physiological only when normally performed, and may become distinctly pathological when thrown out of normal balance. It seems unnecessary to cite evidence in support of this view, which I take for granted is self-evident.

There is, however, an aspect of the dentitional process to which I wish to direct your attention, because, in the first place, I do not think it has received the consideration which it deserves, and second, because it will enable us to study the nervous relations of the process of tooth-evolution from a different viewpoint, and perhaps to arrive at a better understanding of its importance.

I have used the phrase "The Stress of Dentition" to designate the central thought of this paper, and the idea which I desire to convey in that designation is that the process of tooth-evolution, or dentition, in children represents a definite amount of physiological work which has to be performed by the growing organism over and above the work which that organism is ordinarily called upon to perform. The teething process has been well described by the late Dr. James W. White as "an anatomical and physiological crisis of infancy" comparable in that respect to other crises of development, as for example puberty, the menopause, etc. The infant organism is not in a condition of stable physiological equilibrium with respect to its processes of waste and repair as is the organism of the normal adult. Its nervous system is relatively larger as compared with its body mass than in the adult. Its intake of food is also relatively greater, its respiration and heart-beat are more rapid,

and its metabolic activity is more intense for the reason that besides the physiological activity which it is required to maintain for purposes of repair and waste, large additional provision for growth must be made. In the normal infant where all of its physiological processes are in harmonious relation a balance or equilibrium of the factors concerned in nutrition results, and progressive development proceeds without difficulty. The normal equilibrium is in the very nature of the case a delicately adjusted one. It requires but slight interference with any of the elements of this nicely balanced complexus of forces to disturb its progress or even to arrest it altogether.

Faults of inheritance, errors of nutrition, bad hygienic conditions, and the many evil influences resulting from ignorance as to proper management of health conditions, may so lower the standard of vital resistance that while the infant may have a measure of health sufficient to maintain it through the exigencies of ordinary existence, yet it is not possessed of that amount of robust vitality necessary to carry it safely through the teething period without accident. We may liken the vital status of such an infant to a bicycle in motion. When the propelling energy put into the machine by its rider is sufficient to overcome the attraction of gravitation, the wheel remains upright and progresses on its course. The energy expended upon it, we will assume, is just sufficient to propel the wheel upon a level surface. Let it now encounter an elevation in the road and because of its lack of surplus potential it fails to meet the added stress which the hill imposes, and it falls to the ground unless its rider can at once supply the additional energy needed to overcome the obstacle. In the case of the weakling infant the crisis of dentition imposes a physiological stress which may be likened to that imposed by the hill to the slowly moving bicycle. The normal nutritional balance is destroyed through the nervous stress which dentition imposes in these cases, and various morbid phenomena varying in their character and intensity ensue as sequelæ. The manner in which the continued irritation leads to functional derangement of the digestive and assimilative processes and lessens the general resistance of the organism to bacterial invasion need not be elaborated here, being well understood. So also the phenomena of nervous exhaustion leading to convulsions and collapse are matters of textbook record.

There is, however, a class of morbid nervous phenomena associated or coincident with the teething period concerning the dental relationship of which much less is known, and to which I will ask your attention. I refer to the disorder known as infantile chorea, or "St. Vitus' dance." It seems to me to be highly significant that infantile chorea manifests itself most prominently, and we may say almost exclusively, during that period of development when the evolution of the permanent denture and shedding of the primary denture are in progress—that is, from four to nine years of age. Anyone who has taken the trouble to examine a series of skulls covering the ages referred to must have been struck with the extraordinary evidences of dental activity which they manifest. The alveolar arches of both mandible and maxilla seem to be overcrowded with teeth in all stages of development and resorption, indicating a functional activity, with all of its necessary increase in vascular and nervous intensity, far above that which is normal to these regions after tooth-evolution is complete. And when we reflect that the innovation of these tissues and organs undergoing such rapid development is most intimately and directly related to the central nervous system through the fifth cranial nerve and great sympathetic, it would require no stretch of the imagination to reach the conclusion that any abnormality or error in the dental development at this period would easily result in reflex morbid phenomena in other parts of the body.

I have had opportunity to study a few cases, and one case very minutely, where reflex disturbances of a marked type were distinctly related to the process of

tooth-evolution during the period under consideration. A child of nervous temperament, for a period of two weeks or more preceding the shedding of each of the deciduous teeth developed a degree of nervous irritability increasing in intensity until upon several occasions marked hysterical manifestations supervened, which subsided at once when the deciduous tooth was replaced by its successor. The nervous stress of the dentitional process in all of the cases which I have had opportunity to examine was of a marked character, and was associated with the type of children who are often said to be growing too fast and who frequently have to be taken out of school owing to their inability to endure without nervous injury the labor imposed by the ordinary educational processes. I have suggested that infantile chorea may perhaps be directly related to the dentitional process as a result of stress through peripheral nervous irritation. I have been led to suspect this relation, first, because of the correspondence in time between the dentitional period and that in which infantile chorea almost exclusively manifests itself; second, because of the well-known occurrence of reflex nervous disturbances from peripheral dental irritation in certain cases; third, because the lesion in fatal cases of infantile chorea, a hyperemia of the capillary vessels of the corpus striatum and floor of the fourth ventricle, is in rather close relation to the deep origin of the motor root of the fifth cranial nerve; and finally, because at least two cases have been observed in which chorea was immediately cured by relieving the peripheral dental irritation. One case was in the practice of Prof. James Truman,* in which instance choreic manifestations were promptly dispelled by deep lancing over an erupting second permanent molar; in the other case, in the practice of Prof. C. N. Peirce, similar conditions were permanently relieved by the removal of a deciduous molar which was interfering with the eruption of its succedaneous premolar.

I offer these suggestions with the purpose that they may stimulate further observation and study with the hope, and I may say expectation, that such investigation will ultimately aid in the solution of some of the more obscure problems of neuro-pathology. And to that end I desire to emphasize my belief that the process of dentition does represent a stress of work which the young organism may or may not perform without injury to itself, depending upon whether its nutritional processes are up to normal standard or otherwise.

FURTHER EXPERIMENTS TO PREVENT VERTICAL CONTRACTION OF VULCANITE.

By Dr. STEWART J. SPENCE, Chattanooga, Tenn.

SOME of my readers may remember that in the March 1904 Cosmos I presented an article entitled "Experiments in Vulcanite to Prevent Vertical Contraction," in which I pointed out that vulcanized rubber contracts in diameter (if uncontrolled) about two per cent. in descending from 320° F. to ordinary temperature, and that this contraction, though largely prevented by the plaster investment from proceeding laterally (that is, reducing the area of the plate), is not so prevented from proceeding vertically (that is, reducing the thickness of a plate); so that if a plate be, say, half an inch thick, its contraction is one-hundredth of an inch, which by taking place along the alveolar ridge

* James Truman, D.D.S. "Reflexes from Lower Molars." *Int. Dent. Jour.*, Oct. 1899, vol. xx, p. 641.

acts the same, as regards adaptation, as though the palatal dome of the plate were raised to that extent. To remedy this evil the writer suggested the embedment of serrated platinoid bars placed vertically in the thick portions of the rubber. Later he used narrow strips cut from 16-gage aluminum plate, serrating their edges, cutting them into various lengths, and inserting them into the rubber not quite vertically, so that the model would in closing press down any that were a little too long. This was an improvement on the older plan, being easier to do, but still not ideal.

The writer was haunted by the idea that possibly some treatment might be given to rubber which would overcome its contraction altogether. He hoped to find a way to eliminate the contraction of vulcanite as he had, after searching twenty years, found a way to eliminate the expansion of plaster. To do this without affecting the quality of the vulcanite was the difficulty of the problem. He had found by multitudinous experiments in plaster that the problem was not merely to prevent its expansion during crystallization, but also during vulcanization, and at the same time to get a plaster hard enough to resist compression during flask-closing, and one that would retain enough of this hardness during vulcanization to successfully resist contraction and warpage of plate in cooling besides other qualities; all of which taught him not to largely indulge the hope of finding a way to prevent the contraction of vulcanite without injuring it in other ways. With this discouraging prospect before him he procrastinated making experiments in this line, and after a while was led to abandon this idea of using a non-contracting vulcanite for the entire plate, considering that one which contracts is better for the palatal portion, because of its drawing this down a little, and so throwing more pressure on the alveolar ridge; and also reflecting that the very slight vertical contraction which takes place in the buccal and palatal portions of the plate, where the plate is rarely over one-twelfth of an inch thick, is distributed equally throughout the plate, and thus does not take place in one part at the expense of another. This is different where one part of the plate is thicker than another.

It remained, therefore, only to find a way to impart non-contractility to the rubber which composes the bulky portions of thick plates. And even if this should be done by some alloy, which would of course reduce the strength of the vulcanite, yet as it would be used only in thick and therefore strong parts of the plate, this would be no serious objection. Under these considerations the writer naturally turned to the metals, and to aluminum as a light metal and one which well unites with vulcanite, and he found that pulverized aluminum when mixed with vulcanizable rubber in the proportion of twenty-five per cent. by weight of aluminum will not only entirely prevent contraction but also porosity of vulcanite, and with weighted rubber only twelve and one-half per cent. aluminum is required. The rubber is reduced to a soft pulp by chloroform, this requiring about five minutes, when the powdered aluminum is crushed into the rubber by means of mortar and pestle. In a few minutes a soft doughy mass is formed, which may be kneaded in the hands for a few minutes longer, by which time a fairly thorough mixing has been accomplished. It is then spread out for an hour or two to allow further evaporation of the chloroform, which would retard vulcanization if retained. It is well to employ no more chloroform than is necessary, as experiments seem to indicate that an excess of this solvent makes the rubber vulcanize less hard, even after abundant time for evaporation.

I will not burden these pages with a record of the twenty-five or thirty experiments by which I reached these conclusions, but try to satisfy the reader's demand for demonstration by a brief synopsis of them, thus: Doherty's No. 2 rubber was mixed with aluminum in four grades of division, viz, pulverized, coarse filings, small pinhead-sized lumps, and short rods. After a first trial the last two were excluded from the test, and in the further trial between the first two

it was demonstrated that twenty per cent. of the powder produced results as perfect as regards non-contraction and non-porosity as seventy-five per cent. of the filings, beside yielding a much tougher vulcanite. The weighted rubber used was that of The S. S. White Dental Mfg. Co., which being already alloyed with metal, required less aluminum to yield the desired result. The tests for contraction were made on strips of vulcanite $2 \times \frac{1}{4} \times \frac{1}{12}$ inches, and for porosity on blocks of a cubic one-half inch. The strips were measured by a method admitting of not more error than one-fifth of one per cent., and the blocks were tested for porosity by being sawed asunder. A strip of the unalloyed rubber showed the usual contraction—1/25 inch in two inches, and a block of similar rubber showed spongy vulcanite for about a cubic one-fourth inch of its interior, while the blocks of rubber alloyed with aluminum as before described were absolutely solid and the strips were without contraction. Smaller quantities of the powder than twenty per cent. yielded a slight contraction, and in some cases even twenty per cent. gave a suspicion of shrinkage, so that twenty-five per cent. was settled on as certainly sufficient.

Because of this absence of porosity it is safe to say that when this alloyed rubber is used as a "filler" in thick places in plates the solidity of this filler will prevent contraction of the thin enveloping walls of unalloyed rubber. Should the alloyed rubber leak through the wall of the other, no special harm is done, for the shade is anything but unsightly, and it takes a good polish. Still it is, of course, somewhat more brittle than pure rubber, as all alloyed rubbers must be, and therefore it had better not be allowed at the pinheads. There is no objection on the score of its chemical action on the pins, for experiments have shown that it has no effect whatever on the platinum pin, and does not corrode nickel ones more than does ordinary rubber. How the acids of the mouth would act on the aluminum if exposed to them by being allowed to appear on the surface of plate, of course remains to be seen.

Pulverized aluminum may be obtained at drug stores which keep painters' supplies, it being extensively used in sign painting. The writer has met with two grades of it, one marked "chemically pure aluminum" and the other "pure aluminum," the latter being perhaps alloyed with tin. Together with other pulverized metals, they go under the general name of "bronzes." The writer has tested both these grades, and cannot detect any difference in their action upon rubber. They are quite cheap, being about twenty cents per ounce. As, however, it is a little trouble to the dentist to make the mixture, I hope some manufacturer of dental rubber will consider it worth while to put this material on the market.

Before closing, let me say a few words on vertical contraction of vulcanite and vertical expansion of plaster, both of which act alike in causing the plate to bear unduly on the palatal dome. In the impression, vertical expansion of plaster is practically *nil* in its effects, because an impression is usually about equally thick throughout, but not so in the model, which may be only one-fourth inch thick at the palatal summit and an inch thick over the alveolar ridge, this making three-fourths inch of plaster in which vertical expansion counts—lowering the ridge and heightening the palate. Most Paris plasters expand in setting not less than one per cent., so that three-fourths inch, or 19 mm., would expand not less than 0.19 mm.

As another expansion of the model occurs during the early stage of vulcanization (by about the time 320° F. has been reached), and as this is usually of about the same extent as that of crystallization, we get 0.38 mm. of expansion in all. To this must be added the compression of the model in flask-closing, or rather, the difference between the compression of the ridge and that of the palate, which latter suffers most, being farthest from outlets. As this compression varies from 0.01 mm. in one part of a model to 0.5 mm. in other parts, it is safe to reckon the difference between ridge and palate at not less than

0.1 mm. This elevation of the model's palate of course results in elevation of the plate's palate. To these must be added the before-mentioned vertical contraction of vulcanite along the alveolar ridge, which in a plate 12.5 mm. thick is about 0.25 mm. By adding these four factors together we get 0.73 mm. as the disproportion between the ridge and summit of the plate as compared with the natural mouth, in a plate of these somewhat extreme dimensions. From this it appears that the use of the non-contracting rubber eliminates only about one-third of this disproportion. But the plate gets some aid from another source. The areal contraction of the plate (*i.e.* the contraction proceeding from its extremities to its center about the rugæ) reduces the evil to the extent to which it draws down the palatal dome of the plate, which it does in proportion as the investment is soft and as the palatal portion of the plate is thick and therefore strong to contract and overcome the resistance of the investment. But the softer the investment the greater the danger of warpage of the plate. This reduction of the palate by areal contraction of the plate would be more effective in counteracting the before-mentioned factors tending to throw undue bearing on the roof were it not that much of it is consumed in counteracting the areal expansion of the model, and of the impression if of plaster of Paris. But this is again complicated and difficult to calculate from the fact that the flanges of the tray partly prevent lateral expansion, and cause instead a bulging up of the palate, which of course also tends to cause undue pressure of the plate there. However, there is always some reduction of the dome of a plate by areal contraction, because the expansion of a model is directed laterally, while the contraction of a vulcanite palate is not quite lateral but directed downward to the degree that the rubber over the ridge is lower than that at the summit of the dome. The use of a non-expanding and sufficiently hard-setting plaster eliminates all these evils, so that together with a non-contracting rubber for thick plates an almost *exact* fit can be obtained. An exact fit, however, is not always a *correct* fit; indeed, it is so only for mouths which are hard throughout; but where the alveolar ridge is softer than the palatal ridge, as is usually the case, it is better that the plate press harder on the alveolar ridge, the more so because some ridges apparently undergo a slight absorption during the few months following the insertion of a plate, and therefore a plaster for investment which can be mixed sufficiently hard to prevent warpage and yet allow a slight reduction of palate by areal contraction of vulcanite is ideal. Where such material is not used, I recommend coating the alveolar ridge portion of the impression with several layers of thick varnish, as recommended in Harris's "Principles and Practice of Dentistry," also giving the investment a day to harden; doing this rather than risk warping while courting contraction of the palate by the use of soft investment.

A PLEA FOR MORE THOROUGH DENTAL ASEPSIS.

By F. L. FOSSUME, D.D.S., New York City, N. Y.

(Read at the tenth annual meeting of the Northeastern Dental Association, Hartford, Conn., October 20, 1904.)

IN this paper, which I have made as brief and concise as possible—much more so than the subject warrants perhaps—it is not my hope or intention to add anything new to the subject of aseptic surgery. I shall not discuss methods or means of aseptic treatment; still less shall I endeavor to give you a scientific treatise on this subject when each of you has at hand in his library the published results of the investigations and experiments of such men as Drs. Miller, Williams, and Black, to mention the leaders among a host of great men.

In making a plea for more thorough aseptic procedure, I am not trying to make converts, but merely hoping that what I have to say on this subject will make more thorough in their work and encourage along higher lines of professional work men who already agree with me in the general underlying principles of the subject under discussion.

Antiseptics and germicides are the means by which surgery has reached its present wonderfully high plane as an exact science, and without which operations now performed with little danger would not even be attempted, or if attempted would in the cases of patients of average physical condition result ultimately in failure through septic infection.

It would seem almost unnecessary and superfluous to call attention to the value of or make a plea for aseptic procedure and immaculate cleanliness in dental operations, when we as dental surgeons operate daily in the buccal cavity which is infected and attacked by micro-organisms more than any other part or organ in the human body. But, nevertheless, it is a strange and deplorable fact that dental offices and instruments are unclean to an astonishing degree, and that too when the remedies for this condition are simple and at the hands of everyone.

The responsibility resting on us as dental surgeons cannot be too deeply appreciated, as it has been scientifically demonstrated that every pathological lesion found in the oral cavity is due to the attacks of micro-organisms. We cannot excavate a simple carious tooth, remove tartar, or even touch the surface of the mucous membrane without having septic matter cling to our instruments, and only by the highest order of prophylactic and aseptic methods can we hope to keep our patients' mouths reasonably sweet and clean and aid in arresting and preventing decay of the teeth; and this is viewing the subject only in its minor aspects.

In the treatment of the more serious and advanced diseased conditions such as abscesses from putrescent root-canals, fistulas, necrosis, periosteal, infection, septic pulpitis, pyorrhea alveolaris, suppurative gingivitis, etc., the most powerful and reliable germicides are necessary to overcome and permanently destroy the active and vital pathogenic germs. Aside from actual aseptic surgical interference by which relief and physiologic order is invariably quickly reestablished, our hands and instruments and the whole environment of the patient must be scrupulously clean and every possibility of external infection removed. If care in these respects is not taken, the case instead of improving may increase in severity and develop symptoms of an alarming nature, and often

lead to a general septic infection ending in a state of pyemia or septicemia from which the patient may take months to recover. As to the importance of our instruments being thoroughly sterilized after each patient and placed in cabinets free from dust and reasonably aseptic, we need only consider for a moment how easily septic matter can be transmitted from the mouth and infected tissues of one person to another; this fact is so generally known that even persons to whom the laws of hygiene are a blank letter and who know practically nothing of the development of aseptic surgery, would not knowingly submit to such conditions, and to refined and intelligent people such conditions would be simply revolting.

The handpiece of the dental engine which always comes in contact with the lips and corners of the mouth, is never cleaned properly by some, on account of being immovably attached to the dental engine. Drinking glasses, rubber dam, napkins, and every office appliance should be cleaned in such a manner as to be entirely free from foreign and possibly contagious adhesions. Aside from the ethical feature of this proposition, which is of course the highest point of view, it cannot be gainsaid that in its most material aspect the advantages to the dentist who observes the methods of aseptic surgery are great, notwithstanding that the expense of initiating and keeping such a system may be and generally is considerable.

The average patient is much more observing than he is generally given credit for, and even if he does not observe the lax conditions which prevail in an office where thorough methods do not obtain, yet the results themselves speak volumes, and, as a rule, they speak very soon. In any community it will quickly be found that those of our profession who strenuously live up to the requirements of asepsis will find their time occupied with a lucrative practice, and those who do not observe these methods and yet have a fair practice, and who possibly might fear that they would lose rather than gain by such a change, owing to a lack of appreciation on the part of the patients and a fear of their unwillingness to pay the extra charges necessary—to such I would say that the real danger is that they may lose the practice they now have, as aseptic dentistry has come to stay and is recognized as much outside of the profession as in it.

It should be the highest ambition of all who desire to maintain the highest ideals of our profession to use the best preventive methods and to so perform work that re-decay cannot occur. By understanding the principles of cavity formation and by so contouring crowns and fillings that the interdental space is preserved and protected by the proper knuckling of tooth against tooth, the possibility of food and other foreign substances packing and lodging between the teeth will be eliminated so far as possible. Every joint and surface must be smoothed and polished, band and caps should fit snugly and be adjusted around the gingival margin so that the periosteum is not encroached upon, and the medium by which they are cemented in place be as hermetically protected as possible.

The mouth, in relation to the alimentary canal is actually the organ in which the first step in digestion takes place, and no matter how pure and healthful the food may be, it becomes contaminated and a carrier of infectious germs to other parts of the alimentary canal when the mouth is in a filthy and unclean state. The constant swallowing of pus and poisonous excretion will in time undermine the best digestion and produce most serious disorders of the internal organs, especially if previous weakness exists; and in long neglected cases the debilitating effect will usually end in chronic pyemia, which sometimes most stubbornly resists treatment, and is usually recognized by peculiar pallor of complexion, muddy look of the white of the eye, fetid breath, and other symptoms.

Constitutional and organic diseases, such as albuminuria, tuberculosis, neurasthenia, phosphaturia, diabetes, and rheumatic and gouty disorders, are invariably recorded by symptoms in the

mouth, and in turn, owing to these disturbed conditions, the tissues of the mouth become devitalized and lose their otherwise enormous resisting power to such an extent that serious infections of the mucous membrane, gingiva, and periosteum ensue. Owing to the loss of the pericementum necrosis of the alveolus and loosening of the teeth add to the suffering of the patient and lessen the chances of recovery.

These conditions of the mouth and the other weakened organs of the body act and react on each other; the control of one at least of the causes of trouble is in the hands of our profession, and our services are more and more recognized by medical men as indispensable under such and kindred conditions.

It is so self-evident and its importance so often dwelt upon that the polishing of the teeth should take place at regular and stated intervals, according to the judgment of the dentist, and that the patient must do his part in following out the instructions of the dentist, that nothing more need be said on this phase.

I will take up your time for a few minutes commenting upon the reasons that have been advanced to me by brother dentists for not conducting their practice on aseptic lines. The most serious objection seems to be the time consumed without adequate compensation. Another reason is that they can make more money by seeing from ten to thirty patients a day and hurrying through with their work at so much per filling than they can by any other plan of work. As to these objections, I have already stated that I believe the highest compensation in every case will follow the highest class of dental work, and that such work is quickly recognized.

As to those who have such a large *clientèle,* no matter whether or not it is made up of patients willing to pay large fees, it is certain that the most profitable results can be obtained by subdividing the work and giving associates the work which calls for the least degree of skill, and by insisting that the highest order of aseptic work shall be performed by all. When the system is thoroughly organized the cost to the practitioner will be little indeed and absolutely unimportant in comparison with the results. Many young graduates would only be too glad to associate themselves with a high-class office and become thoroughly trained in these methods which are bound to prevail. The patients themselves will take kindly to such a system when they realize that it is directed and watched over by a man who has established his reputation and desires to maintain it.

No doubt one of the fundamental causes of the neglect of aseptic methods is the lack of training in prophylaxis in the colleges, many dental colleges even now not being equipped with sterilizers, and ignoring almost wholly or in part any practical training in this most important branch of the dental curriculum.

Nevertheless, the literature on this subject is abundant and so readily obtained that there is no adequate excuse for neglecting it on the part of those who sincerely believe in it and who are willing to conscientiously devote themselves to it.

The effect morally and intellectually on the man who puts his work on the highest plane cannot fail to be beneficial. The struggle for ideals, even when they are chimeras, has its elevating effect, and when these ideals are only ideals because comparatively few practice them, and their great value is conceded by those who use them least, the desirability of their adoption cannot be doubted.

Aseptic surgery is the only surgery known today by men of the first rank. It is just as true of dental as of medical work. Those who adopt it least will always be the last in their profession.

CORRESPONDENCE.

MENTAL PHENOMENA UNDER BRIEF ANESTHESIA.

To the Editor of the Dental Cosmos:

Sir,—There is quite a range of mental experiences which the professional student of psychology would be glad to have recorded and to utilize, but which in the ordinary course of circumstances are not likely to fall under his immediate observation. Taking advantage of the cordial spirit of co-operation which exists among representatives of the different professions he may feel warranted in making a direct appeal to those who, with quite other interests, meet the situations likely to furnish the desired material. It is such a request that leads me to present my problem to the readers of the Cosmos.

Dentists, perhaps more than any other branch of practitioners, deal with brief periods of anesthesia, and have an opportunity of observing the mental effects which characterize these states, and more particularly the period of transition from waking to subdued consciousness, and then again in the recovery from the effect of the first and back to the normal waking state. The experiences of these transitional periods, and particularly of the recovery, are likely to present phenomena of some interest. My request is accordingly for detailed accounts of interesting observations which the patient would in many cases be capable of submitting, were he at once questioned in regard to the occupation of his mind before and after the action of the anesthetic. Of the several points of interest thus to be observed I should specify those in which my own interests happened to be paramount. These relate to evidences of automatic action, of increased suggestibility, such as is characteristic of the hypnotic state, of the performance of actions in conditions similar to absent-mindedness or distraction, of the presence of dreams in deeper anesthesia which owe their origin to the experience just preceding the operation, or it may be of the operation itself, and finally careful questioning during the moments of recovery, with the purpose to determine what kind of a response the subject was really making, how far the anesthesia was complete, the knowledge of the environment gone, the possibilities of memory present, the realization of the surroundings disturbed.

It may lead to more definite observations if I cite a few cases which have come to me casually. A good instance of automatic suggestibility was that of a young lady recovering from a brief anesthesia who, by no means fully conscious, but able to speak, though with some indistinctness, began to complain of feeling very cold. This sensation was suggested by the fact that a friend in the room, feeling some draft from the window, had put on a dressing jacket. A moment later the patient noticed that the other friend, who was busy attending to her, had taken off her collar and rolled up her sleeves. The sensation was immediately changed, and she complained of feeling very warm. Both actions were in the nature of an automatic, imitative response, which was just about able to reach the half-active mind. I have another record in which a dream was carried through the entire operation, beginning with the meeting of a friend along a strange road, then a conversation which led to some difference of opinion, followed by a wholly unexpected and rude blow on the mouth and a dull feeling of pain. Of course this dream and the issue thereof were the reaction of the operation of extracting a tooth and of the fact that the friend had been in the consciousness of the subject up to the moment of the operation. I have an-

other instance in which the dream was purely visual and consisted in the play of colors and geometric forms such as appears in the kaleidoscope, the patterns proving to be those of the wall-paper on the ceiling of the dentist's operating room; that is, the last visual impression which the subject had before the nitrous oxid gas was administered. These sporadic instances must not be accepted as exhausting the kind of data which are desired. I mention these mainly to point out that very commonplace and ordinary instances are as much desired and may prove to be of as great value as those of more unusual occurrences. It is on the whole not the unusualness but the completeness of the observation that makes it valuable. One important factor in the completeness is the patient's ability to account for the various factors of these dreams, referring them to their basis in the waking state, and furnishing such other clews as may rescue them from the more fanciful productions of the imagination, and bring them in harmony with the ordinary movements of the mind in casual or intent thought. I also lay special consideration upon any systematic observations by experiment or questioning, which will bring out the suggestible character of the patient when his higher centers have been put to sleep by anesthesia. Anyone at all familiar with the experiences of the hypnotic state, or indeed who has tried to get response from a sleeping person without waking him up, or has been able to produce movement in such a person without arousing consciousness, will appreciate that the same kind of operation is possible in subjects recovering from brief anesthesia. It may even be worth while, in favorably disposed cases, to put a pencil in the subject's hand and see whether automatic writing would result in response to questions which the subject gives evidence of hearing, though perhaps he is as yet unable to give response. In brief, I prefer to suggest to practitioners the general line of inquiry in which I have an interest and upon which I find a complete deficiency of literature, and rest the case with them to furnsh such observations as will contribute to a clearer understanding of these interesting dreaming and half conscious states. My request is accordingly that those who have opportunity to make these observations will be good enough to send to the address given below such records as they are able to gather. It will give me great pleasure to record this obligation in any public use that I shall make of these records. Such publication will naturally be subject to the consent of the interested persons. I trust that a considerable number of dental practitioners will find interest in this topic and will be willing to aid a student of a very different line of phenomena to gather data important to his science.

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PROCEEDINGS OF SOCIETIES.

FOURTH INTERNATIONAL DENTAL CONGRESS, ST. LOUIS, MO., AUGUST 29 TO SEPTEMBER 3, 1904.

(Continued from page 593.)

SECTION VI: Orthodontia.

Chairman, Dr. EDWARD H. ANGLE, St. Louis, Mo.
Secretary, Dr. MILTON T. WATSON, Detroit, Mich.

THE CHAIRMAN. The next paper on the program is by Dr. CALVIN S. CASE of Chicago, Ill., and is entitled "Principles and Technic of Retention in Orthodontia." [This paper, with illustrations, is printed at page 649 of the present issue of the COSMOS.]

Discussion.

Dr. VARNEY E. BARNES, Cleveland, O. In the first place, I wish to commend what Dr. Case has to say on the subject of inherited tendencies. Many of the writers of the last year or two have not agreed with him in this matter; but I must say that experience with cases treated has shown that cases with inherited tendencies are much harder to retain than other cases. As yet, I am not satisfied that extreme cases of class II, Angle classification, are going to be retained permanently. Some may, but others indicate that they will not. Time and scientific investigation alone will prove this.

The essayist said that occlusion of the anterior teeth is the most important. It is not so. It is only apparent at a superficial glance, and will not bear close investigation or the test of years. The patient and parents may be satisfied, but what about the whole occlusion? Retention of the anterior teeth does not by any means indicate that the posterior teeth are to remain retained and in correct position. We want good results all around the arch and the best results where they are to give the patient the most good. This is the most important; with it you are certain to have good appearance also.

He has also brought up the subject of extraction of the first or second molar in preference to the possible later extraction of the third molar. Look at the history of these same third molars and put its insignificant value alongside of the proved utility of the first and second molars. As for extracting immediately in protrusion cases, too much condemnation cannot be expressed, because you cannot tell beforehand that you are to have failure without extraction unless you try it. Try *without extraction* first; if you fail you still have the other method. This I believe is the only justifiable method. If you extract without trial you are guilty of malpractice.

I am not able to agree with the essayist that a removable retainer is not a good thing. In many cases it is good. It depends very much on what we know of our patient and the case whether we will use a fixed or removable retainer. Some will never wear this kind of appliance, while others will wear it and take care of it. On some patients you cannot

get the retainer too strong or well attached. It is a matter of judgment, no fixed rule will hold.

Extremely rigid appliances are not, in my estimation, the best. The ideal appliance would seem to be one fixed at one end and flexibly attached at another, approximating nature's mobility of the teeth. Let us have rigidity in the direction of a return to the original position and a degree of flexibility in all other directions. When a rigid appliance is taken from teeth they are somewhat loose, but soon tighten. Would not a semi-flexible appliance reduce this looseness?

As to this retainer as shown on the screen, I may say that I have used it for over three years, finally giving it up because it was only good for well-shaped teeth in the anterior part of the arch. The more important teeth are not held by it. The spaces left between the teeth were too great. I found that the cement would wash out and would often not be noticed. The little lugs would break off, necessitating the removal of the entire appliance.

Dr. S. H. Guilford, Philadelphia, Pa. I have listened with pleasure, interest, and profit to the paper of Dr. Case. Dr. Case and I work along very similar lines, his views and mine corresponding very closely.

This matter of retention is one of the most important in the whole range of orthodontia. In the early days it was very much neglected and undervalued. I remember very distinctly how much I was criticised many years ago for undertaking to regulate teeth before all of the permanent ones had come into place. I was told that it was wrong and cruel, and that the effects would not last. It was not so, for the simple reason that at that time we were already in possession of a little device or method which had not been in use very long, namely, the cementing of a band to the natural tooth. To my mind it seemed to solve the whole problem of retention, or nearly so. Previous to that time those who regulated teeth brought them into correct position but they did not hold them there, or held them for too short a time, and the result was that the teeth went back to their old positions, resulting in failure. This was of such common occurrence that it came to be a common saying that "you can correct irregularities, but you cannot retain the results obtained." Magill's idea of simply cementing a band on the tooth was one of the greatest advances in orthodontia up to that time, and even now I do not see how we could accomplish satisfactory results without it.

There was one point that I wish Dr. Case had emphasized more fully. He alluded to it, and that is the question of retaining the teeth in the fixed or permanent position. Magill's plan enables us to form a variety of splints, attach them to the teeth and hold them so firmly that they cannot possibly move while the new tissue is being formed around them. It is doing what the surgeon does when an arm or long bone has been broken. He places the parts in position and adjusts the splints so as to prevent the parts from moving while they are being united.

As to the appliances themselves, we must make them, of course, to suit the conditions which are present. I was very much surprised today in going through the adjoining room to notice a collection of models of corrected irregularities, on many of which the note was made "Retained in position six months," or "eight months," and so on. While the gentleman undoubtedly accomplished good results, I do not see how he will retain them in so short a time. The retaining must be continued for a sufficient length of time. As to how long it shall be, that is determined by the character of the irregularity which has been corrected, by the age of the patient, and a variety of other conditions. But we must hold them in their new positions sufficiently long, and before dismissing the patient and calling the case finished we must see that the teeth do not go back to any appreciable extent.

My plan is, after I have placed the retaining appliance, to see the case at frequent intervals until a sufficient length of time has gone by to warrant its re-

moval, then I take it off and allow the patient to go for a few days or possibly a week, and then have him return. The retaining appliance is then placed loosely on the teeth, and if it goes into position without any special effort, I conclude that the teeth have not begun to move back. I may then let it go for two weeks, and the next time three weeks, and keep on in that way until I am satisfied that the results obtained are permanent.

Another point is that we cannot predict with any certainty whether the teeth are going to remain in as good position as they were when we finished the work. This is because with all our care the teeth are liable to move a little out of their former positions; you will notice that particularly in cases where the irregularity seems to be very slight. For instance, the torsion or turning of the upper lateral incisors where they are just a little out of place. Under those circumstances the essayist recommends that they be turned a little beyond their proper line. Certainly that is the correct plan. I mention this because moved teeth will often change their positions slightly, even after long retention, and we should provide for it in advance. Even then, however, we cannot always expect to retain quite as good results as we had at the time the operation was completed. I therefore feel that by the retention of the teeth by proper means and for a sufficient length of time, and by a careful examination after we have decided to remove the appliance, we can frequently get a result which under other circumstances we would not be able to obtain. This feature of regulating has not as yet been sufficiently emphasized and dwelt upon either in the text-books or in college teaching, because those who teach and those who write frequently take for granted that others know as much about it as they do. It is one of those things that needs to be emphasized, and I am glad that Dr. Case has dwelt upon it at such length.

Dr. R. Ottolengui, New York, N. Y. Shall we have a fixed retainer or a movable retainer? The question was dismissed almost in a line by the essayist, who says that there is rarely any use for a removable retainer. The fixed retainer serves a very useful, but very rare purpose; the removable retainer answers very nearly all cases. Dr. Case admitted after dismissing the removable fixture that the fixed retainer should be examined once a month. Now if that is admitted, that is almost enough to throw it out of practice. All patients cannot be seen once a month; many patients often come from a distance for this special work, and when they leave it should be possible for the operator to feel sure that he will never feel like returning a part of the fee should he receive a letter from a thousand miles away saying, "My teeth have returned to their original condition."

What has been advanced as the objection to the plate as a retaining fixture? That it is filthy; but it is not. That it will injure the teeth, but it will not—that is, if it is properly applied and properly made. On the contrary, I wish to state unhesitatingly, after fifteen years of continuous use of this apparatus, that the patients in whose mouths I have placed it, and patients who have continued in my care, have required less filling operations than any other patients who have come to me; and why? Because this removable fixture, as I make it, is of iridio-platinum—a plate with either gold or iridio-platinum attachments; and the little patient is instructed that it must be daily removed and boiled in soda, that it is to be removed before the meal is eaten, and the teeth are to be cleaned before it is returned; this rule, which is insisted upon, does much to create a prophylactic habit in the patient at an early age and so does more in an inferential or suggestive way to preserve the teeth than it could possibly do to injure them.

At first observation is made of the direction in which each tooth has been moved. A model on which the retaining fixture is to be made is carefully carved, by which I mean if we see a lateral incisor has been moved inwardly, the labial surface of the lateral incisor is slightly

trimmed away, and so wherever a tooth has been moved or a part of the tooth has been moved a portion of the surface of that tooth is trimmed away, then after the plate has been fitted to the mouth a surrounding wire is made to absolutely touch the plaster model at every point. Thus when it is in the hands it may appear to be a simple wire encircling the teeth. It is more than that; it has an invisible stress within itself; there is a special bearing on every tooth which has been moved, a bearing in the direction in which the teeth were moved and a tendency to prevent them from moving back. That is my appliance. As I said, it is used for everything except extensive rotations that involve extensive softening of the socket. Such teeth should be held rigid long enough for bone to be deposited. Frequently such fixed retainers may be made and worn in conjunction with the removable appliance.

With the removable appliance we have the advantage that there is absolutely no limit to the time it may be worn, and you are not disturbed in your mind by the etiology or inherited tendencies of the case. "There is your retaining fixture, my little girl; you must wear it as long as your teeth have any tendency to return. If you wish to go to a ball, leave it at home, and don't carry that disfigurement with you to the ball. If you have company, remove it." But for the first six or eight months you give your patient no such latitude. Later on the appliance is worn only at night.

But there is absolutely no limit to the time which the appliance must be worn. To show the usefulness of this I have recently had in my office a little patient (now twenty-two years of age) who has a fixture which was originally placed on her tooth when she was fourteen years of age. She has several times reported to me that after leaving it out three or four months she noticed a slight movement back to the original position. But after replacing the original retainer the tooth regains its correct position.

Dr. Case (closing the discussion). From experience in my own practice, patients who wear a fixed appliance that is immovable and perfectly attached to the teeth with considerable strength and stability and has a strong and long rigid bar on the tooth, apparently holding the teeth firmly in position, I find that even with this appliance cemented to the tooth I cannot in many of my cases hold the teeth; how, then, is it possible to hold a tooth with a plate that a little child can put in and out of the mouth at will—a plate which has no rigid grasp on the tooth—what could be said of such a plate as that? In these cases where the arches of the teeth have been moved considerably, with great tendency of the arch to return to the former position, and in fact with sufficient force to even bend unannealed wires of No. 16 gage (and I often get that condition) I have to remove the wires and place larger ones in to prevent that great force exerted by moved roots in their tendency to change position. Therefore I do not see how it is possible that a plate would suffice.

The session then adjourned.

Third Day—Wednesday, August 31.

The session was called to order at 2.15 p.m. by the chairman, Dr. Angle.

The Chairman. The next paper to come before this section is one by Dr. R. Ottolengui of New York city, entitled "Spreading the Maxillæ *vs.* Spreading the Arch."

[This paper together with the discussion which it elicited will appear in the Proceedings of the Fourth International Dental Congress.]

The Chairman. We have now an important paper from a very eminent man who has come from far across the seas to talk to us today—a man who is well known, and I take great pleasure in introducing to you Dr. John E. Grevers of Amsterdam, Holland, who will offer a proposal for an international nomenclature for the various forms of malocclusion. His paper is entitled "Odontharmosis: A Classification of the Various Forms of Occlusion of the Teeth."

[Dr. Grevers' paper was printed at page 552 of the May issue of the Cosmos.]

Discussion.

The Chairman. I am sure we are all very much interested in this subject. I am glad to know they have the same difficulties in Europe as we do here in trying to find short and comprehensive terms to describe teeth in the various forms of malocclusion. All of us who have struggled along these lines certainly can appreciate this very excellent paper of Dr. Grevers. Of course we cannot now estimate the true value of the paper. We must have time to think and reason over it, but I can see that it contains thoughts of much value. I will now call on Dr. A. H. Thompson to open the discussion.

Dr. A. H. Thompson, Topeka, Kans. I regret that I did not hear all of the paper, but I was much impressed with what I did hear, and I am quite pleased with the classification that Dr. Grevers has given us, and especially in the matter of nomenclature, to which I have given some study. Orthodontia is one of the newer branches in which we are eminently in need of a more comprehensive nomenclature, and it seems to me that the suggestions of Dr. Grevers are in that direction.

There is one point that has been referred to, the matter of abrasion, to which I want to make a contribution, and that is in regard to edge-to-edge occlusion. I have examined hundreds of skulls of Peruvians and Mexicans and made examinations in regard to dental ethnology, and I find invariably this abrasion that is attributed to edge-to-edge wear. I have also found in most Europeans that are tobacco chewers a great deal of edge-to-edge abrasion. Some old tobacco worm who has chewed almost continuously for forty years or more will almost always exhibit this occlusion, and my idea is that it is the wearing away of the cusps that leads to the protrusion of the mandible (in that way bringing about edge-to-edge occlusion and abrasion) as well as the vicious habit of reaching out as the edge becomes worn, so there is a still greater tendency to bring the jaw forward. Among the ancient races I have observed there was not this edge-to-edge occlusion among the young and children. I have noticed that among the Peruvians and Mexicans there is not the edge-to-edge occlusion among the young people. I make this as a contribution, not a criticism. So far as my observation goes, among the apes there is no edge-to-edge occlusion except when there has been incessant wear. In the gorilla and chimpanzee class there is edge-to-edge occlusion where there is wear. As a rule, unless there is wear there is not this edge-to-edge occlusion. So my opinion is that the edge-to-edge occlusion has been brought about by excessive mechanical abrasion.

You will notice in some of the cases illustrated of what we call "jumping the bite," there is a sliding forward of the lower jaw.

Dr. Grevers (closing the discussion). I thank the gentlemen for their remarks and I appreciate the criticisms made. I recognize that in this nomenclature the etiology is a quantity or anatomical relation that is neglected.

The Chairman. One of the hopeful signs in the field of orthodontia is that a type of men are becoming interested who are broad-minded and thoughtful, and who are not content to confine their studies to the much-threshed, petty, insignificant regulating-appliance corner of this field, but are reaching out in their researches into those questions which have a broad yet direct bearing on the practice of orthodontia. It is with much pleasure I introduce to you the next speaker, Dr. José J. Rojo of the City of Mexico, Mexico, who will speak to us on the etiology of anomalies in human teeth.

Etiological Study of Some Anomalies in Human Teeth.

Orthodontia is an interesting branch of surgery, and as the mother science progresses new specialties are born in

obedience to a law that has been enunciated by Auguste Comte, who says that: "By a law whose necessity is self-evident, every branch of science insensibly separates itself from the main trunk as soon as it has acquired sufficient development to support an isolated culture; that is to say, as soon as it has reached a point where it can in itself occupy the permanent activity of certain intelligences."

The work which I have the honor to present to you is of the character of a study especially founded on the etiology of the dental anomalies of position, as these doubtless mostly occupy the mind of the orthodontist.

Magitot was the first to classify the dental anomalies of mankind, but did so in too extensive a manner. Later on, Professor Dubois accepted Magitot's classification, simplified it in part, although he introduced nine new forms together with their subdivisions. I believe that this classification can be still further simplified by placing the cases in the order of frequency, as follows:

Classification of Dr. Angle.

(1) Anomalies of position,	Class I.	Arches in Normal Mesio-Distal Relations.
	Class II.	Division I. Subdivision. Division II. Subdivision.
	Class III.	Division. Subdivision.
(2) Anomalies of eruption,		Delayed. Premature.
(3) Anomalies of number,		Increase. Decrease.
(4) Anomalies of form,		Partial. Total.
(5) Anomalies of structure,		Partial. General.
(6) Anomalies of jaws,		Retrusion. Protrusion.

Etiological studies are from their very nature difficult to explain, and for this reason perhaps it is that we frequently find apparent deficiencies on this point in text-books on the subject. These difficulties may be illustrated by the following example. If we take a vessel full of water and abandon it to a group of persons in order that each one may pour into it a drop of a different substance, and afterwards we try to find out to what element that water owes its altered color, it will be almost impossible to discover. It is a very difficult matter, and on the other hand probably of little practical utility from the surgical point of view; but if we were to neglect our etiological studies we would soon be reduced to the position of mere mechanics, and there would be no difference between the blacksmith who hammers out bars of steel and the surgeon who puts into their proper places the delicate dental organs.

Let us therefore endeavor to discover the immediate causes of dental anomalies. Two are the causes that have been unanimously accepted: the *accidental and mechanical,* and the *hereditary.*

The accidental and mechanical causes are unquestionably those that have produced the greatest number of anomalies, especially those of class I under the Angle classification, but nevertheless they accidentally give rise to the misplacements of classes II and III.

From the original structure of the anterior part of the maxilla, which at one period is formed of four distinct cellular groups, we can easily suppose that on account of its greatly complicated circulatory network it is more frequently exposed to the accidents of nutrition and evolution, and thus we can explain why it is that the upper incisors are those that more especially suffer the consequences of altered functional activity.

Accidental diseases, such as meningitis, eruptive fevers, anemia, chlorosis, etc., which work by debilitating the system of the child and arresting development, are the principal causes of the anomalies of eruption, and these in their turn give rise to the greater part of the cases of anomalies of position.

The mechanical causes consist of extractions or premature loss of the dental organs, whether of the temporary or of

the permanent set, the delay in the shedding of the temporary teeth, the delay or prematureness in the eruption of the permanent teeth, all of which causes give rise by a simple mechanical effect to the formation of numerous anomalies of position.

External forces, such as the muscular pressure of the bony frame of children, the habit of biting hard bodies with the front teeth and occluding the mandible in a forced position, also form part of the group of accidental or mechanical causes.

In these cases, the persons who suffer from dental anomalies are healthy, and though their development has been partially altered it may be said to be normal; the teeth present no indications of hereditary disease, and the misplacements are generally confined to these without greatly affecting the bodies of the jaws or the physiognomy.

The dental deformities that are caused by heredity are those that present the greatest difficulties in forming conclusions; but notwithstanding that a multitude of anomalies can be attributed only to these causes, it is necessary to study them with special care.

The causes at work during intrauterine life may be divided into two classes: *heredo-physiological* and *heredo-pathological.* The introduction of new scientific terms requires that they should represent a clear and precise idea of the subject to which they refer, and by the term heredo-physiological it is my intention to express certain aspects that are hereditary and at the same time cannot be attributed to any pathological cause. The term heredo-pathological expresses the idea that any given pathological condition in a system is hereditary.

The dental malformations that proceed from physiological heredity are those that are transmitted from generation to generation and that do not reveal by any special indication that they might be considered pathological traces, but that only appear to reveal a certain condition of life in certain individuals. Among these anomalies we may mention the following: Prognathism peculiar to certain races and which in this case cannot be considered as an anomaly; the tendency to have one or more teeth slightly crossed or twisted, especially the upper central and the lateral incisors. Other causes arise from family tendencies, by which the upper right or left lateral remains in distal occlusion. This classification also includes any supernumerary tooth, or the absence of one or more teeth, especially of the upper laterals.

The theory that for some time has been sustained, that the crossing of races was one of the causes of misplacement, is a theory hardly sustainable, principally through physical disproportion of the progenitors; that when one of the progenitors has a large frame with large-sized teeth set in large jaws and the other has a small frame with comparatively small jaws and teeth, the child may inherit the large teeth of one and the small jaws of the other, I consider ought to be entirely disregarded in our discussions, as we frequently observe among our patients that children with marked dental anomalies are frequently born of physically well-proportioned parents; and on the other hand the laws of biology would not give to one being a right arm of sixty-one centimeters with a left arm of fifty centimeters, except in the case in which a superior force—such as a morbid diathesis—caused such disproportions.

The individuals who present the heredo-physiological anomalies are generally perfectly constituted and developed; the structure, color, and form of their teeth are normal, and do not reveal the presence of any pathological diathesis in their organism. The anomalies from which they suffer will almost exclusively come under class I, and only accidentally under classes I and II.

The anomalies caused by pathological heredity are very frequent, and, unfortunately, for a very natural reason, are the most difficult to explain. Patients thus afflicted usually conceal the nature of the disturbances with which they are afflicted. On the other hand, through the want of exact external indications

which would reveal either in the progenitors or in their descendants a present disease or the traces of an old disease, the practitioner often finds it impossible to diagnose with certainty the hereditary influence that has given rise to the particular anomaly.

Alcoholism, scrofula, syphilis, and nervous diseases are the principal morbid processes that give rise to dental anomalies through pathological heredity.

The children of alcoholic, scrofulous, and insane persons, or those suffering from nervous affections, are generally children of poor or degenerate constitution, weak and of deficient vitality, and who, through factors which do not act directly on the buccal organs but on the general system, have a great propensity to suffer from anomalies of eruption, and the latter in their turn produce numerous anomalies of position. Their weak health explains everything; the physiological functions are altered and the whole system suffers. The anomalies that are most frequently found in these persons come under classes I and II; the latter probably through a relaxation of the muscles or articular cartilage of the temporo-maxillary articulation or else through the fact that the bony structure of the mandible is better able to resist the pathological influences.

Lombroso calls attention to the presence of certain anomalies in criminals, in his work "The Criminal Man" (pages 242 to 248, vol. i).

Syphilis is unquestionably the most injurious morbid affection of the human system and may be considered as the direct cause of a great number of dental anomalies.

If we examine the mouths of congenital deaf mutes, of blind, of insane, and criminal persons, we will be astonished at the fabulous number of dental anomalies which we will discover in those persons. On the other hand, we will find that the principal causes of these congenital affections are syphilis and alcoholism.

In his masterly treatise on "Latent Hereditary Syphilis" Fournier presents the clearest evidence of the anatomo-pathological effects of hereditary syphilis on the system.

Hutchinson, to whom Fournier as well as all familiar with his work render due homage, was the first to point out the influence of hereditary syphilis on the production of dental anomalies of structure, and it is due to this fact that in a great number of text-books the name of Hutchinson teeth is given to those that appear as though they had been cut out on the cutting edges, a characteristic that in many cases originates from hereditary syphilis.

Besides these anomalies, Fournier presents us a multitude of other malformations, such as dental erosions, *cupule, facettes, sillon nappe,* dental amorphism, vulnerability of the dental system, giving as principal causes a delay in the evolution, and modification of structure.

Among the classes of erosion described by Fournier we find cross stains in the upper incisors indicative of hereditary syphilis, and we could attribute to the same pathological cause the production of those whitish stains frequently found associated with certain anomalies in the dental system, as well as other specific indications. These stains which represent a form of anomaly in superficial structure are frequently noted in children absolutely free from syphilitic diathesis, as can easily be proved by the entire absence of the specific syphilitic indications.

Hutchinson, Jackson, Lewin, Klink, Duncan, Bulkley, Lange, and many others confirm the influence that is exercised on the system by hereditary syphilis giving rise to rickets or degeneration, or to what Fournier so expressively calls "syphilitic infantilism;" and as a natural consequence, this gives rise to the anomalies of eruption, producing also anomalies of position, both through a morbid as well as a mechanical effect.

In studying the anomalies in the cranium, nose, and limbs, we find that Hutchinson, Fournier, Lange, Debove, Moynac, and many other pathologists have frequently observed cases of hereditary syphilis in their respective clinics. Fournier classifies the anomalies in the cranium as follows: "Olympic forehead;

forehead with lateral eminences; lateral protuberances; asymmetry in the cranium and hydrocephalic cranium;" deformities of the nose, the organ being larger or smaller than normal either through faulty development or loss of substance by local accidents, while the lower limbs also present frequent deformities.

It is evident that heriditary syphilis is the principal cause of those serious attacks on the skeleton producing among others the anomalies of an Olympic forehead, broken nose, twisted limbs, etc. We do not hesitate to include among these anomalies those of the jaws and the very pronounced ones of dental malocclusion, as only a powerful cause like syphilis can give rise to those buccal monstrosities that constitute to a great extent the anomalies under the subdivisions of classes II and III. Through the tendency of the Hutchinson teeth to assume an oblique and convergent position, we can well suppose that this frequent misplacement, which Professor Guilford has designated by the name of "lancet arch" and "constricted arch," is likewise of syphilitic origin.

It would be absurd to claim that hereditary syphilis is the only cause and that to it are due all of a certain type of anomalies, and at the same time it would be a crime to brand innocent persons who without any syphilitic cause whatever suffer from certain anomalies. As a matter of fact, there are many children that come to ask our good offices as orthodontists who present absolutely not the slightest trace of syphilis.

On the other hand, we find that the children of syphilitic parents, as an exception, do not present anything more than slight traces of the lues of their parents, and we also see children in whom we find certain evidences of hereditary syphilis both in their general constitution as well as in their teeth, in whom nevertheless their jaws and teeth occlude in the correct way; and their bony system does not as a rule present any important anomaly. But at the same time, these exceptional cases must not lead us to forget that all or almost all those who have inherited syphilis present one or more dental anomalies, especially those in classes II and III.

Let us now see what the cellular doctrine says. "Every organism, whether animal or vegetable, represents in the last case either isolated cells or associations of cells. The ovule is a simple cell, and from more or less transformed cells we find resulting the tissues that are farthest in appearance from the cellular type, such as the bony tissue, the vascular tissues, etc.

"The cells are miniature organisms endowed with lives of their own and charged with the fulfillment of a special action in the vast federation of the bodies of plants and animals. However elevated and complex we may suppose the function of an organ, it is always the result of the partial work executed by the cell."*

The morbid agents work in the cells of the human system, both chemically and mechanically; their influence will produce death, or the partial destruction of cells, or the atrophy or destruction of the vesicles that carry the vitality, producing a want of volume in a given region either through the absence of substance or faulty development. By a natural law, if during the period of development we find a region that does not demand physiological force, it is very probable that the region which absorbs the unused vitality of the neighboring region will develop more than it otherwise would if the vitality was distributed in all parts, and would thus produce a greater contrast between the paralyzed or atrophied region and that which is developed or hypertrophied.

Among the morbid processes that are transmitted by heredity, syphilis is that which exercises the greatest destructive power on these cells. If the syphilitic virus is introduced into a healthy organism it attacks and destroys it and partially kills it by the destruction of a multitude of cells, and terminates by poisoning the entire system, manifesting itself at every opportunity. If unfortu-

* S. Ramon Cajal, "Treatise on Histology."

nately the evil continue it will exercise its toxic influence upon the embryo, often leading to pre-natal death. If the embryonal cells are not altered by a scrofulous, lymphatic, or other diatheses, the embryo comes out triumphant from the struggle but with more or less debilitated constitution. Struggling they may reach the age of puberty and be capable of procreating, giving rise to modified or attenuated manifestations that may vary to an infinite degree. In these heredities of the second degree and in the subsequent ones we will find the dental anomalies difficult to diagnose. Perhaps from generation to generation, and after a multitude of cellular struggles, the virus disappears entirely. Not, however, without having induced deformities or degenerations of varied degrees of intensity.

It is difficult to establish a correct prognosis of the variations that may be assumed by these affections in the third, fourth, or fifth generation, but we can safely assert that the vigorous organism, with well-balanced cellular structures, such as that of the Aztec Indian race and others, will better resist these pathological attacks. On the other hand, we will find that either through the increasing efficiency of medical treatment or through the attenuation of the disease in the new generations, its ravages will probably be greatly mitigated.

I must remind you that the present paper is only a study, and that it will be the duty of those who are interested in this important branch of medicine to devote their attention to it in order to throw more light on some of its most interesting points.

Discussion.

Dr. A. H. Thompson, Topeka, Kan. I was very much interested in the paper of Dr. Rojo's. He has presented in a very striking way many of the elements that contribute to the science of orthodontia, but I am scarcely capable of discussing the paper because I am not an expert myself.

I was much impressed with what he said in regard to some of the more prevalent constitutional diseases of civilization; his theory of the effect of malnutrition or lack of nutrition is very interesting. We know that certain diseases cause maldevelopment, but we do not know the intermediate steps; we do not know why certain conditions of malnutrition should cause that effect; we do not know the causes that affect the nerve supply or induce lack of development. There is a great gap to be filled in that particular point bearing on cause and effect; why the diseases should affect the nerves and cause degenerative evolution is something we do not understand.

In regard to syphilis, in countries where it prevails I think it will be gradually eliminated. Nature tends in the process of evolution to abort the things that are injurious; the diseased will perish, so there will probably be a practical lessening of the effects as it is weeded out and gradually eliminated, assisted as it will be by sanitation and improvement along the lines of hygiene. It is so in this country. There are certain races in which a disease prevails—and prevails to a great extent—from absence of hygienic care; this condition will be improved by education and sanitation.

Dr. F. M. Casto, Cleveland, O. I cannot agree with the author upon many points. We must all agree that the etiological study of dental anomalies is difficult and complex, but by the natural law of evolution, by close observation and study, some of our most eminent men have made many points clear.

Dr. Rojo states in his paper, "Two are the causes that have been unanimously accepted, namely, (1) accidental and mechanical, and (2) hereditary." This statement I fear is only too true. I think in nearly all works published on the subject we find just such a division. I accepted this theory quite philosophically, and when a case of malocclusion presented if no cause was made conspicuous by the long retention of deciduous teeth, the extraction of permanent ones, or some other cause equally easy to determine, I

was quite willing indeed to credit it on the hereditary side of the ledger, especially after having been assured by the parent that when she was a child her teeth were exactly the same but all evidences were lost by reason of the cracked teeth having been extracted and artificial ones substituted, or that the father, who was at that particular time in some distant country, had a cracked tooth identically the same. So I went on like hundreds of other men, crediting everything to heredity that I couldn't find an accidental or acquired cause for, until I came under the instruction of Dr. Angle, when my views were materially changed. He taught us to give heredity all credit due it, just as we would any other cause, but he was quite unwilling that we should divide the etiology into two general classes. He gave us the following etiological causes:

(1) Early extraction of deciduous teeth;
(2) Long retention of deciduous teeth;
(3) Extraction of deciduous teeth;
(4) Tardy eruption of deciduous teeth;
(5) Adenoid vegetations or nasal obstruction causing mouth-breathing;
(6) Accidents;
(7) Large tongue;
(8) Abnormal frenum labium;
(9) Heredity;
(10) Habits;
(11) Disuse;
(12) Supernumerary teeth;
(13) Abnormal lip pressure;
(14) Diseases interfering with normal development.

I wish to take exception most decidedly to the author's statement that cases of malocclusion resulting from acquired causes always present practically normal development without involving to any appreciable extent the bodies of the jaws or the physiognomy. Take, for example, a case of class II, 1st division, Angle classification: This case is characterized by distal occlusion of the lower arch; contracted upper arch; protruding upper incisors; sub-development of the mandible; atrophy, or lack of development of the upper lip (caused from its being practically out of function); hypertrophy of the lower lip (due to its being continually caught between the teeth, and bitten); mouth-breathing; poorly developed nares, and all the accessory cavities, namely, the maxillary and frontal sinuses, ethmoidal and sphenoidal cells, the muscles of the cheeks drawn and the child in many cases presenting a decided idiotic expression. The experience of close observers along this special line is that after obtaining a complete history and making a thorough examination most cases belonging to this class as well as in class III were due to local or acquired causes and not to heredity. Certain localities are conducive to certain forms of malocclusion; for instance, there is a prevalence of catarrhal affections around and in near proximity to the Great Lakes, and I am informed by Drs. Watson and Barnes, of Detroit and Cleveland respectively, that a large percentage of the cases coming under their observation belong to class II, Angle classification. Now then, if a child is subjected to such climatic conditions and environments, and develops a catarrhal trouble or adenoid growths, causing it to become a mouth-breather, which results ultimately in a case of malocclusion (class II), and granting that its progenitors were mouth-breathers from the same cause, could we call it heredity? I say, no—most emphatically, no! Again, under the heredo-physiological class the writer claims that heredity so finely asserts itself as to cause very frequently central or lateral incisors to assume a "special form that forces them into a twisted position, while other cases arise from the family tendencies by which the upper right lateral remains in distal occlusion, or one of the teeth becomes superimposed or crossed."

I don't believe this claim can be satisfactorily proved. I have heard other men make this same statement and cite cases that had come under their observation; but I have as yet to see the first one "deliver the goods" in substantiation of the claim. I am convinced that a proper examination of such cases would reveal the fact that an exceedingly large percentage of them are due to acquired causes. Usually such meagre forms of malocclusion are only symptoms of the

real trouble. As I stated before, I believe that heredity plays some part in the etiology of dental anomalies of position but not so much as to be considered *one* of two great causes.

We quite agree that children born under the baneful influences operative in the heredo-pathological class, as described by the author, would probably possess a poor or degenerate constitution, and no doubt all the organs of the body would be more or less affected. The general physiological function would be interfered with and we might expect as a result almost any kind of an abnormality, certainly in the jaws and teeth as well as in other parts of the anatomy.

Hyde defines syphilis as a general infectious disorder transmitted from one individual to another by both contact or inheritance, involving one or several organs of the body, due to the toxic effect of the invasion of the bodily tissues by a morbid germ, the identity of which has not as yet been completely established.

Infection by heredity. By this we mean that the disease is transmitted from the mother to the child in utero, and that the mother has been infected previous to fecundation; it seldom if ever occurs that the child is infected from the father alone. The theory heretofore generally accepted, that the disease manifests itself in the second or third generation, is disproved greatly by a series of investigations made by eminent specialists, who claim in nearly all cases a thorough history of the case resulted in the discovery that the child of the first generation either acquired the disease just previous to birth (the mother having been infected about the same time) or soon after birth from one of the many modes of infection.

The presence of the Hutchinson teeth when associated with parenchymatous keratitis and the scars of former fissures at the angle of the mouth are considered by many as pathognomonic of inherited syphilis.

The CHAIRMAN then called for further discussion of the paper and no one responding, it being very late he called on Dr. Rojo to close the discussion.

Dr. ROJO in closing the discussion thanked the section for the manner in which his paper had been received, and said he would not try to comment on any of the remarks that had been made, as he was not sufficiently well versed in the English language to express himself intelligibly.

The CHAIRMAN announced that the session would begin tomorrow at 2 P.M., when a number of interesting papers would be presented.

The meeting then adjourned.

FOURTH DAY—THURSDAY, SEPTEMBER 1.

The SECRETARY, Dr. M. T. Watson, called the meeting to order at 2.25 P.M., and made the following statement:

Hofzahnarzt W. PFAFF of Dresden, Germany, then read in the German language a *résumé* of his paper on the "Development of Diagnostic and Therapeutic Methods, and the Importance of the Etiology in Relation to Orthodontia." A *résumé* follows:

DEVELOPMENT OF DIAGNOSTIC AND THERAPEUTIC METHODS, AND THE IMPORTANCE OF ETIOLOGY IN RELATION TO ORTHODONTIA.

[*Résumé.*]

Within the limits of a brief paper it is not possible to do justice to the important ramifications of the science of orthodontia.

With the intention of calling forth expression of opinion in a matter of great significance, in my paper I have briefly touched upon the subject of progress in regulating devices viewed from the mechanical standpoint.

How grateful must mankind ever be to such men as Hunter and Fox in England, Schange and Lachaise in France, Dwinelle, Kingsley, and Farrar in America, and Linderer and Carabelli in Germany for their contributions to ortho-

dontia and invention and improvement of mechanical devices used in connection with that science. The appliances of Schange, Carabelli, Kingsley, and Farrar in particular are noted.

The limited scope of my paper does not permit me to allude to a large number of investigators who have contributed to the development of orthodontia; the framework of the science was erected by the men whom I have mentioned and to their conceptions I give the greater prominence.

Impulse came mainly from America, where, thanks to the application of worthy devotees, supremacy is still retained; these efforts are seconded by investigators in Europe whose diligence has raised them to an equal plane.

The work of Angle and Case based as it is upon true scientific principles stands prominently in the foreground. The systems invented by them applied to the correction of irregularities leave nothing to be desired and form a fruitful source of practical methods now drawn upon by the dental profession. In my paper I discuss many methods for correcting irregularities, and I give especial attention to the appliances of Angle and Bergfeld, both constructed on the same principle. The method of Bergfeld has been modified by the essayist. The appliances of Angle possess undoubted advantages over those of Bergfeld, particularly as regards the rapid correction of articulation.

Angle's predominance is made evident by his system of accurate and unfailing diagnosis and correct placing of the first molars, which, after all, is the essential point in the correction of faulty articulation in most irregularities. The moving of the molars is made particularly successful by means of the double result of the intermaxillary anchorage. Angle's classification affords a ready means for diagnosis and constitutes an important addition to orthodontia.

By research the diagnosis and therapeutics of orthodontia have been directed into true and perfectly definite channels. When we take into consideration the correction of facial deformities, the treatment of diseases of the nose and respiratory organs, the elimination of difficult mastication brought about by the use of orthodontic appliances, then must we recognize the great importance of these appliances.

The etiology of maxillary deformities is still in its infancy. Its relation to prophylaxis and therapeutics strongly emphasizes the need for further development. The existing diversity of opinion among specialists in the treatment of maxillary deformities is by no means desirable, yet must eventually lead to successful unanimity.

It is important to properly define each case of maxillary deformity and to have a definite and accurate nomenclature. The results of Walkoff's work might be taken as a basis on which to build a system of nomenclature. A scientific division of irregularities in which they are classed according to generic principles must be adopted and adhered to.

Irregularities are either hereditary or acquired, though their causes may be partly due to faulty development and partly to heredity—as often happens in the intermixture of races. Progressive heredity is often seen. The degree of culture as well as the intermixture of races has an influence upon the formation of the jaws, as is exemplified by Kingsley.

A paper entitled "On the Correction of Deformities Resulting from Fractures of the Nose," by Dr. Francisque Martin of Lyons, France, was read by title. The paper is here appended:

On the Correction of Deformities Resulting from Fractures of the Nose, According to the Method of Claude Martin (of Lyons, France).

The reduction and maintenance of fragments in fractures of the nose is connected with orthodontia in the similitude of the apparatus applicable in both cases. We are taking up this question, convinced that should the occasion present itself we could apply the great principles of our art to any part of the human

body; for, as my father said at the Madrid congress of 1903,* "the dentist is an invaluable auxiliary of the surgeon in all restorations of the face."

(1) *Instrumentation.*—In cases of fractures of the nose, if one would obtain a good correction of the deformity, it is necessary, as Cl. Martin said at the International Congress of 1900,† to replace the fragments from the interior of the nose, and to keep them in position by means of apparatus giving pressure from below upwards and left in place during the time necessary for consolidation.

In order to attain this twofold end, we employ two distinct apparatus. One, the apparatus for regulating, is a lever-forceps with two branches opening by pressing the handles; one of the branches is fixed, and rests on the floor of the nasal cavities, while the other free end presses against the posterior surface of the nasal bones themselves, and thus raises them. The second, the apparatus of retention, of a somewhat special type, is destined to maintain the raised fragments. The instrumentation is completed by an external adjunct in the form of a lyre, molded on the contour of the nose, to which is fixed the afore-mentioned apparatus of retention, to prevent a backward displacement.

(2) *Reduction.*—To perform the reduction and to apply the apparatus of retention, we anesthetize the patient with ethyl chlorid, which gives a quick anesthesia and one that can be maintained without danger during the short time necessary for the operation.

The lever-forceps are sufficiently powerful to allow of an easy reduction of all recent fractures. In some cases of long standing fractures, where the bones themselves are irregularly consolidated, it would be necessary to prepare the work of the forceps by a preliminary operation of osteotomy.

The reduction once accomplished, the apparatus of retention is applied. The latter does not merely act on the fragments which it raises; it maintains also the septum in a rectilineal direction, preventing its deviation.

(3) *Consecutive treatment.*—For the next few days frequent injections of boiled water should be made in the nose. When once the instrument is introduced and the necessary degree of pressure attained the pain from the operation ceases.

The pressure on the mucous lining of the nose is generally well borne (despite the adverse opinion of some surgeons) if the pressure from the apparatus be gentle, progressive, and the apparatus itself be absolutely immovable.

Dr. WATSON. The next paper on the program is by Dr. H. A. PULLEN of Buffalo, N. Y.

An abstract of the paper here follows:

THE GREAT FIRST CLASS OF MALOCCLUSION. [*Abstract.*]

As an integral part of this great international dental congress the section of orthodontia owes to it and to the profession at this time an epitome of its progress and its most advanced thought, with the object in view of presenting the most scientific, the most practical, and the most beneficial methods of treatment of malocclusion known to the experienced specialist in this science.

The responsibility falling to the essayist is therefore a great one, and were it not for the enthusiastic confidence in the results obtainable from following out basic principles of occlusion we would be less willing to accept the responsibility, though appreciating the honor conferred.

The importance of the thorough understanding of primary principles in the study of any science cannot be overestimated, for upon certain basic facts depend its evolution through logical deductive methods of reasoning.

The science of orthodontia, with normal occlusion as the basis from which all deductions are made, especially merits the scientific study of those of the profession who appreciate the value of logical inference from general truths.

* Dr. Claude Martin, "Report on the Bucco-Facial Prosthesis and the Skeleton."

† Thirteenth International Congress of Medicine, Chirurgical Section, p. 800.

The theory of occlusion is not yet so old that a repetition of its fundamental principles can be unacceptable to those who are looking for the hidden mysteries in this vast field, for occlusion is the key, the "open sesame," to the realization of the ideal in results to be obtained from treatment suggested by following its teaching.

Feeling that an exhibition of casts of treated cases and photographs of patients before and after treatment according to the ideal in occlusal and facial restoration might be interesting and instructive by way of illustration of the treatment of irregularities of the teeth from the basis of occlusion, the American Society of Orthodontists have contributed some of the best of their work by way of duplicates of casts of treated cases of malocclusion, together with the photographs of patients before and after treatment, and placed them in a collection which may be found in the exhibit room of the orthodontia section, the same to be placed in the National Museum at Washington (after its exhibition here) for preservation and reference.

We feel that the theory of occlusion is of such vast importance to the science of dentistry and especially to orthodontia, that at this meeting, the greatest convention of dentists ever held, is the time when we should consolidate our efforts and concentrate the attention and attract the interest of the whole profession in our work, hoping thereby to increase the general interest in the science of orthodontia and thereby improve its practice by helpful suggestions and criticisms.

Occlusion, then, in all its phases and relationships is the one centralized thought, the objective point in our papers and discussions.

Normal occlusion is the ideal from which we start and which we strive to attain in treatment of malocclusion. It is the basis of the science of orthodontia; yes, and we might well say it is the basis of all dentistry, for it is inclusive of all that is normal and ideal in the dental arch, the perfection of forms and surfaces of the teeth, and the harmonious relations of not only one tooth to its neighbor but of all the teeth in one arch to all of those of the other.

Occlusion must be considered in every step in orthodontia—in diagnosis, prognosis, treatment, retention, and restoration of normal facial lines.

Before proceeding further let us define occlusion, which is the ideal from which and to which the orthodontist works.

Normal occlusion is a condition of perfect relationship existing between the normally formed and aligned teeth of normal dental and alveolar arches of maxilla and mandible, when in antagonism the mandible being in its farthest posterior position, and in perfect median register with the maxilla, and both in normal relationship with contiguous tissues.

Under the absolute conditions of this definition, an existing malocclusion is an irregularity in any position the arches of teeth may assume in their relation to each other except that of normal occlusion. It has been claimed that in full protrusions and full retrusions of the upper and lower teeth a malocclusion did not necessarily exist, the argument being based no doubt upon the theory that both upper and lower arches were normal in shape and alignment of teeth and that the teeth were still in occlusion or antagonism with interlocking cusps.

But the fallacy of this claim is evident when it is pointed out that a malocclusion is any variation from a *normal* occlusion, not an abnormal occlusion, such as is present in protrusions of either arch.

The loss of but a single tooth from either of these arches would have a very serious effect upon both of them, and would be the beginning of the destruction of occlusion and the forces operating to maintain it. The importance of the individual tooth, therefore, cannot be too strongly impressed.

Extraction for the correction of malocclusion has been in the past altogether too prominent a feature. At present it is contra-indicated, unless the case is complicated by previous mutilation by

extraction or some unusual and extraordinary development.

Classification.—The Angle classification for malocclusion is based upon the variation from the harmonious relationship known as normal occlusion, three great classes being represented, the first having normal mesio-distal relations of arches, the second having the lower arch distal to normal in its relation to the upper either unilaterally or bilaterally, the third having the lower arch mesial to normal in its relation to the upper either unilaterally or bilaterally.

The great majority of cases of malocclusion belong to the first class, the second class comprising but a small percentage and the third class a still smaller percentage of the various existing cases of malocclusion.

Diagnosis.—Recognizing a case of malocclusion as belonging to one of the above classes is equivalent to diagnosing it, or in other words it is equivalent to determining the exact extent to which the arches have become altered from normal occlusion, and consequently is indicative of the changes in occlusal relations necessary to restore normal occlusion. The restoration of the latter being the ideal result in treatment, the possibility or advisability of obtaining it in any case of malocclusion may be foretold with a reasonable degree of certainty. Thus prognosis, which in times past was somewhat doubtful in the majority of cases, is now rendered nearly accurate in every case, and that which formerly was a source of never-ending worry is now a pleasure.

Complications by loss of teeth render the diagnosis extremely difficult in some cases, yet a careful study of the changes in occlusal relations as the result of extraction, will reveal the treatment necessary.

The three-class scheme of classification of malocclusion is not an artificial grouping of different varieties of malocclusion based upon the variation of the profile from the normal or the kind of force appliance used, but is a natural grouping of the different forms of malocclusion based upon the variation from the normal of the occlusal relations of the teeth as suggested from the observations of the antero-posterior relationship of the teeth in occlusion.

The facial lines being dependent upon normal occlusion for their normal relationship the occlusion is the prime factor of importance rather than the facial lines.

In the three-class scheme of classification the facial inharmony is only a symptom of the imperfect occlusion, being variable in the first class and of a certain more definite and recurrent type in the second and third classes.

Class I is diagnosed by the normal mesio-distal relationship of the arches of teeth, and the relative positions of the first molars is usually taken as a guide in making the diagnosis of this as well as the other two classes.

In the absence of the first molar by extraction the positions of the teeth adjacent to the space are noted as well as that of the canine if erupted, and the normal relationship mesio-distally determined by some one or two or more teeth on each side of the arch, which being in their normal positions of occlusion give the clue to normal mesio-distal relationship of the arches.

The first molars are the points one would naturally select to determine whether the mesio-distal relationship of the arches of teeth is normal, because of their early eruption into occlusion, at which time they are the only permanent teeth in the posterior part of the mouth which are erupted and capable of retaining the normal occlusal relations during the shedding of the deciduous teeth.

General Treatment—Class I.

The indicated treatment in cases of this class is restoration of normal occlusion by harmonizing the arches of teeth, expanding one or both arches where contracted, bringing all of the teeth into their line of occlusion.

All spaces closed because of premature loss of deciduous teeth or extraction of permanent teeth must be opened to their normal width in order to restore normal

size and shapes of the arches, and allow for the eruption of the unerupted teeth or for artificial substitutes where the natural organs have been extracted. Extraction is always contra-indicated, unless an artificial substitute is imperative because of a diseased tooth.

It is necessary to restore the full complement of teeth in both arches in order to get the best results in occlusion and facial lines.

The ideal treatment differing with each of the three classes, as suggested by the study of normal occlusion as the basis of diagnosis of malocclusion, is the restoration of the arches to their normal relationship one with the other whenever possible.

Such treatment includes expansion of arches, contraction of arches, mesial or distal changes in the relations of the arches unilaterally or bilaterally, and the various movements of individual teeth necessary to the restoration of occlusal inclined planes to their normal position. The nearer the attainment of normal occlusion in the correction of any case of malocclusion the less need is there for retention, the normal influence of the inclined planes as well as the other forces governing normal occlusion acting to preserve the positions obtained.

With normal relations of the arches established, the jaws, muscles of mastication, the cheeks, lips, and facial lines will be in best harmony with the type peculiar to the individual, for a perfect profile requires normal occlusal relations.

The appliances used are very simple, being the well-known expansion arch supported by tube or molar clamp bands, accompanied by bands or individual teeth with spur on band and arch so located as to make the application of the force from the ligatures most direct in the line of their movement.

In protrusion of class I, the Baker anchorage is now used in order to obtain the added assistance of occlusal anchorage in the pitting of one arch of teeth against those of the other, thus forming material assistance and saving much time in treatment.

It is a fact that malocclusion is noted and treatment begun at a very much earlier age than ever before, because of the greater ease with which the operations may be performed on cartilaginous tissues than on solid or semi-solid bone, and because of the less number of teeth to be moved at a period when the first molars and incisors are the only permanent teeth present—as from eight to ten years of age; also, it being the period of development of the oral tissues, the jaws and facial muscles will develop normally if the normal occlusion of the first molars be secured when first erupted and the full space retained for every permanent tooth anterior to them until they are erupted.

If there is one point of more importance than occlusion which I wish to make prominent in this paper it is that of operating during the period of development of the teeth and jaws rather than waiting until the permanent teeth are all erupted and the deformity confirmed in its position by the abnormal development; the greater density of the bone, the increased difficulty and length of the operation, and the distortion of the facial lines in many cases become confirmed also in the abnormal position through habit and abnormal development.

The average age of the patients presenting to the orthodontist is ten or eleven years, and a much earlier age for operating is preferred when it is noted that even at the age of nine many defects in occlusion are seen which might have been prevented if the patient could have been seen at intervals from the time of the eruption of the first molars.

As the far-seeing and up-to-date operative dentist believes in "extension for prevention," the prophylactic specialist in "cleanliness or prophylaxis for the prevention of decay," so the orthodontist believes in "early interference for prevention of malocclusion."

It is a common procedure to correct a developing malocclusion at an early age, before the eruption of the bicuspids or second molars, and to see the same case at intervals until these teeth have all erupted into normal occlusion, thus being assured of the permanence of the result.

In the first class of malocclusion the teeth may be in any possible position of malocclusion which would be consistent with a normal antero-posterior relationship between the arches of teeth. For example, any of the incisors and canines may be in labial or lingual occlusion, or the bicuspids and molars in buccal or lingual occlusion. There may be protrusions of the anterior part of the upper arch or retrusions of the anterior part of the lower arch without disturbing the normal antero-posterior relationship.

The incisors and canines above and below may occlude normally, while the bicuspids and molars are in malocclusion. Again, there may be a combination of irregularities, such as a protrusion of the upper anterior teeth and a lingual protrusion of the lingual bicuspids and molars. A retrusion of the lower anterior teeth on one side is noticeable in many cases of premature loss of the deciduous molars, also, one side of the arch normal, and the upper or lower teeth on the opposite side in buccal or lingual protrusion.

There are present in this class a number of etiological characteristics, such as a prolonged retention of the deciduous teeth, the premature loss of deciduous teeth, supernumerary teeth, and other anomalies, abnormal frenum labium, lip-biting and thumb-sucking, although these characteristics are not confined to the class of cases under discussion.

Associated with many of the malocclusions may be found nose and throat troubles, adenoids, enlarged tonsils, and other complications which probably serve as a primary cause for many undeveloped and unformed arches through lack of normal lymph or blood supply and consequent lack of the nutrition necessary to secure normal development.

Dr. Watson. The next paper is by Privatdocent Dr. Schroeder, on prognathous forms and their orthopedic treatment. I have the pleasure to introduce Dr. Schroeder to you.

Privatdocent Dr. Hermann Schroeder of Greifswald, Germany, responded and gave his address in the German language. A *résumé* follows:

Studies on Prognathism. [*Résumé.*]

The author defines prognathism from the standpoint of the anthropologist. Anthropological investigations have not been duly taken into consideration in dental literature, and likewise anthropologists have omitted consideration of the shape, function, and other characteristics of the teeth. Orthodontists should not lose sight of the fact that the development and function of the jaws influence the face at the naso-frontal region and all the other facial points which anthropologists use as guides in their measurements, which may be changed by alterations in the shape of the jaws.

A thorough study of the function and structure of the bones of the face is one of the requisites of the orthodontist. The bones of the face in their arrangement, structure, etc., should be studied by means of the X ray.

The author discusses extensively all the forms of prognathism, not omitting what he terms physiological prognathism, which he fully describes before entering upon the study of the several types caused by pathological developments often so difficult to diagnose.

He studies the anatomical relations of the bones of the face in prognathism and shows the artistic result of treatment when carried on in harmony with their cause. The study of all of the forms of prognathism is a *sine qua non* for the successful orthodontist.

Discussion.

Dr. N. S. Hoff, Ann Arbor, Mich. This paper follows very closely the object we desire to reach in placing the practice of orthodontia on a scientific basis, which seems to be the keynote for most of the work that has been presented in the various sections of the congress which I have attended. The study of etiology is essential before we can arrive at any basic principle of practice. It may be well for us to remember when making a study of these problems that we should not undertake to study the pathological con-

dition we find in extraordinary operations and attempt from those pathological specimens to derive fundamental principles, because they are unusual and happen so seldom that they are not of sufficient importance to be of any great value in establishing principles of development, even of pathological principles. We learn little of practical value from perverted development under abnormal conditions. I do not think it well to spend much effort to establish principles for treating pathological conditions which result in very great deformities of only occasional occurrence.

We have to treat teeth that are brought into malocclusion because of diseases of the teeth and their environment, and I agree with the author that it is almost impossible or impracticable to undertake to establish results that have come from certain diseases of the bone, restore the teeth to occlusion and transform the bone into normal structure. You all know how difficult it is to attempt to bring into normal relation teeth that have been driven out of this relation in pyorrhea, for instance, or diseases of the gum, and how much more difficult it is when we get a more serious disease of the jaw. It is also a serious problem to undertake to treat those conditions which result from interruption in the embryonic or developmental period.

So I think that while these things are interesting, they do not serve as a basis upon which we can build very satisfactory principles for the practice of the art of orthodontia.

Dr. Schroeder closed the discussion in German.

The section then adjourned *sine die*.

SECTION VII: Operative Dentistry.

Chairman—C. N. Johnson, Chicago, Ill.
Secretary—Geo. E. Hunt, Indianapolis, Ind.

First Day—Monday, August 29.

Dr. C. N. Johnson, the chairman, called the section to order at 2 o'clock P.M., and after a few preliminary remarks delivered his address to the section.

Chairman's Address.

It is not my intention to make any extended remarks at the opening of the sessions of this section. I merely wish to call attention to the great possibilities of the work to be accomplished during the coming week in our deliberations on the various topics presented for consideration. These topics embrace a wide range of subject-matter from the broad question of "Operative Dentistry" itself —a paper which seemed to your chairman to be of such a character as to preclude the necessity for a lengthy chairman's address—to the more specific subjects of filling pulp-canals, the specific gravity of gold fillings, inlay work—considered in a somewhat new light—the enamel in cavity preparation, filling materials of various kinds, matrices, pressure anesthesia, etc.

Operative dentistry is extending year by year in its scope to a degree which keeps even its most earnest devotees constantly on the alert to encompass its varying phases of development. New ideas spring up in rapid succession to be advocated more or less strenuously by those who introduce them, then to be digested by the profession, and if found available to be finally assimilated into our professional knowledge.

In this process there is frequently much which of necessity must be cast aside as waste material, and it is to this sifting procedure which we are now about to devote our energies. In deliberations such as these it is well to have the contact of minds not only of different individuals but also of different groups of

thinkers as represented by those coming from different sections or different countries. And so today we are most fortunately situated in having with us representative men from all parts of the world assembled together with the sole object of getting at the truth of many of the perplexing problems which confront us in our service to the human race. Above all things it is the truth we are seeking, and in our deliberations let us at all times consider only the essentials of the subject and eliminate so far as possible our preconceived and personal predilections, to the end that we may accomplish the greatest good to the greatest number.

Remember that the saving of the human teeth, the placing of them in a condition of comfort, usefulness, and beauty is the true function of operative dentistry. Just so long as we approach our discussions with this end in view just so long will our meeting together be profitable, but if we allow ulterior or irrelevant ideas to bias us and carry us away from this main purpose then shall we dissipate our energies and go away from the meeting little better than we came.

I now most cordially invite you to the work of the session with the earnest hope that every member of the section may feel himself impressed with the idea that our time is precious, and that every moment of it should be occupied to the best advantage.

Dr. E. K. Wedelstaedt then read a paper by Dr. E. A. Bogue, New York, upon the subject of

Operative Dentistry.

Operative dentistry, as I understand it, is such a combination of science and art as enables the operator to so repair defective human teeth as to preserve the dental arches for the longest possible period of time and in the best possible condition. To that end it behooves us to understand the meaning and the use of the positions, shapes, sizes, texture, and color of the normal human teeth.

The enamel of the teeth begins to form on the summit of the cusps and extends downward toward the center of the grinding surface. On the sides it forms downward from the apex of the cusps toward the cervix of the tooth at the gum. If the vigor of the individual is sufficient to perfectly form that enamel, completely to bridge over the sulci and to leave no crevices between the different plates of enamel as they approach each other, then the tooth will have a perfect coat of mail, so to speak—a perfect coating of enamel, polished on the surface and hard. In all those cases where this degree of strength has existed in the formative processes, the teeth will be found rounded and not flat, rather short, and if not interfered with in their development, they will be regularly arranged in the two antagonizing arches, upper and lower, in such fashion that the very act of mastication is preservative, in that it tends toward cleansing those teeth through the processes of mastication and insalivation.

Superadd to this plenty of water and coarse and fibrous food and we shall have a dental apparatus that has no need of dentists nor of tooth-brushes or silk. Antiseptic mouth-washes would be uncalled for, and all the paraphernalia of modern dentistry would be a superfluity. By just so much as we lack of these conditions, decay and calculus enter in and become the antagonists of health and comfort.

By just so much therefore as we can take the cases presented for our care and restore them to the conditions just described as normal, by just so much have we put the patient upon the road to retain his teeth in comfort for the longest possible time.

At whatever point we have failed in restoring normal conditions and normal function we have left a weak point for the attack of one or other of the two diseases that we combat. These two diseases are decay and calcic deposit. The former of these arising from an acid condition existing somewhere in contact with the tooth; the latter—calculus—being most rapidly deposited when the conditions surrounding the tooth are alkaline. But both conditions involve the

presence of some foreign substance or substances upon the tooth which do not belong there, and which, were the highest normal conditions always present, would never be there for any length of time.

But how is operative dentistry to control either or both of these conditions? It is to do it indirectly by placing the teeth into such a normal condition that they may be kept clean, and then by instructing all patients not only that the teeth need to be kept clean, but by showing them how to do it.

Operative dentistry does not consist in extracting teeth and replacing them with artificial substitutes, nor even in relieving pain, nor in filling up a few cavities in teeth presented by a patient for operation. It is the province of the true dentist to carefully examine each tooth and all the teeth in the mouth, mentally segregating each one from all the others, to carefully note all points where the enamel is deficient, indicating these conditions on an appropriate chart and indicating also all variations, of whatever nature, from normality, and then to explain to the patient what is required and why it is best to restore the teeth in that mouth to a normal condition as far as is practicable.

Perhaps the first thing to be done will be to see to it that all defects in the enamel covering are remedied by substituting an indestructible substance for the defects, so that the enamel may present a smooth and unbroken surface over the whole tooth, a surface upon which food will not be prone to lodge, because both shape and polish are opposed to such lodgment. Next it may be best to see to it that there is absolute and rounded contact between all the teeth of each of the arches, so that they may support each other laterally and so be able to sustain the force of mastication. Finally it may be necessary to replace into their normal position teeth that have gone astray and antagonize improperly.

If I can truthfully say that no child who has been put into my hands during the past twenty years and left there, and of whom I have had oversight regularly, has ever had the toothache or lost a tooth, I am claiming a great deal for operative dentistry. Among the children that I know there is one child whose teeth when erupted had from six to eight cavities of decay in every tooth, and although she is now twenty-five or twenty-six years of age, and the mother of a little family, she has never had a toothache and never lost a tooth. This proves the effectiveness of the treatment and the correctness of the theory on which that treatment is based; and although our absolute knowledge is very limited, enough is known to enable us, in most cases, to preserve the natural organs in comfort to extreme old age, providing we have the intelligent co-operation of the patient.

In 1877 a lady came to me with her lower incisors biting into the gum above in such way as to cause continual soreness and inability to masticate, or even to close the teeth without pain. There were apparently two ways of overcoming the difficulty. One, the empirical way of grinding off a portion of the cutting ends of the lower incisors, and so giving relief for a time. The other way involved building up the ends of the grinding teeth, and so opening the bite. Neither of these expedients seemed to me satisfactory, and I began then to inquire what had caused the difficulty, and to seek as far as circumstances would permit to remove the cause and so to restore the teeth to comfort and utility in the hope of preserving them while life should last. I concluded that the extraction of the principal molars was the main cause of the difficulty, as the approximation of the other teeth in the mouth had greatly shortened the bite. Superadded to that were a number of places where the teeth having approximal cavities of decay had been filled, or had been decayed so deeply as to cause a falling together of the various members of the arches.

I concluded finally to wedge apart all teeth which were decayed approximally and to make contour fillings which would restore the teeth at least to their original size and shape, if indeed the fillings

did not somewhat exaggerate the original size of the teeth. This was done with all the molars, and now for twenty-seven years these fillings have stood, with only one marked breakdown, in the lower left molars, which called for a replacement of the fillings at that point. The bite has been kept open so that the incisor teeth have never again wounded the gums. Incidentally the doctrine recently promulgated of extension for prevention has received a hearty indorsement from the behavior of these fillings during these twenty-seven years, and again, incidentally, it has been proved that the dental arches when supported by thorough contact of each member with its adjoining members are susceptible of standing firmly during many years without a break, while had these molars been capped or built down, or extended in any way to lengthen them without their having been formed into their proper occlusal arches with lateral contact, the teeth so extended would have been driven into their sockets to their former level.

I have upon a number of occasions spoken of a man fifty-two years of age, who told me he had never had a tooth-brush in his mouth. Yet that man's teeth were clean and in good condition, and his gums hard, pink, and healthful. The dental apparatus was so admirably arranged for the purposes of mastication that it not only did that part of the work thoroughly, but in the very act of mastication the teeth were cleansed by the flow of the saliva and by the friction of the food taken in. It is true he lived on plain food, often cooked out-of-doors where his life was mostly passed, he being a railroad contractor on the Trans-Siberian Railroad. When civilization came and gave us soft food instead of hard, cooked food instead of fibrous and raw food, it did us a great damage.

Civilization indulges in soft food, cooked until it is still softer. It is therefore already in the best possible condition to be driven into crevices, there to remain lodged until fermentation shall have produced the acids and bacteria which lead to decay.

This is my reason for thinking that all operative dentists should study with the utmost accuracy the position, size, shape, and arrangement of the teeth in the skulls that are now exposed for our study in the museums, until they know what those forms and positions are that have endured the longest, surviving the vicissitudes of life. Then, and not till then, will we learn that any interference with normal conditions, whether by natural or artificial and mechanical processes, tends toward early destruction. Then, and then only, can we understand what the survival of the fittest means, and only by such study can we know what is that fittest which survives.

Discussion.

Dr. I. B. Davenport, Paris, France. In opening the discussion of Dr. Bogue's paper I find myself in the embarrassing position of complete accord—a condition, I fear, not compatible with proper discussion.

The predominating thought in the paper is prevention. Repair defects and prevent recurrence of disease by bringing about normal conditions of form and occlusion as far as possible, before decay, and pyorrhea, and kindred manifestations make their appearance. We should early determine the defective arrangement of occlusion, and orthodontia becomes an important factor in operative dentistry. At the same time Dr. Bogue recognizes the fact that perfect occlusion is not always possible to secure, and that mastication, as a normal cleanser of the teeth is, owing to modern civilization, usually insufficient. Dr. Bogue insists upon special care, giving special instruction to our patients in all the known methods of insuring cleanliness of the teeth and health of the gums. That Dr. Bogue has faithfully practiced what he preaches, in that he has most successfully preserved the teeth of those brought up under his care, I can personally vouch for by the large number of cases that have come under my direct observation.

In his closing remarks Dr. Bogue

pleads "that operative dentists should study with the utmost accuracy the position, size, shape, and arrangement of the teeth of skulls in museums, until they know what those forms and positions are that have endured the longest and survived the vicissitudes of life, and learn to understand that interference with normal conditions, whether by natural, artificial, or mechanical processes, tends toward early destruction."

These remarks afford me the satisfaction and comfort which only those familiar with dental literature of fifteen to twenty years ago can realize, for not only has the position I then took been proved and accentuated in my daily practice, but Dr. Bogue has proved it true in his own experience.

Dr. E. K. Wedelstaedt, St. Paul, Minn. I am placed in rather an embarrassing position. I have just read this essay and now I am called upon to discuss the ideas which it contains. Each day cases present themselves to us, some of which are the same as those to which Dr. Bogue has called our attention. As Dr. Bogue says, it behooves us to study these different cases with more than ordinary care. The object in making dental operations is the same as is the object in making surgical operations, *i.e.* to eradicate the abnormal conditions, stamp out the disease, and then return the parts to as near a condition of normality as lies in our power. Can we do this in the face of the strenuous life which so many of us are living? Will our patients permit of it being done? I can answer this by saying, that it is being done by every intelligent practitioner who has at heart the welfare of his patients, the dental profession, and humanity.

Where we ignore conditions and do not make a restoration of the parts to that degree of normality which the case demands, we are not doing the best for the patient. We are culpable in bringing discomfort to the patient, in setting a bad example to others and in not doing the best which can be done. The essayist fully illustrates this point in calling our attention to the case where the patient was annoyed by having the lower incisors continually striking into the gum in the lingual surface in the maxilla. This condition he corrected, and the changes he made brought comfort to that patient by returning the parts to a condition of normality. This is well illustrated by taking a typical case. Suppose a patient twenty-six years of age consults us concerning a cavity of decay in the distal surface of an upper right second bicuspid. A cavity of decay also exists in the mesial surface of the adjacent molar. Let us suppose that on account of neglecting this condition the molar has moved forward, causing the teeth to come into contact from the occlusal surface to the gingival margin. The interproximal space has been completely obliterated. What is our duty in this case? Is it to at once fill those cavities, ignoring entirely the conditions which surround the case? Or is it our duty to gain such separation as will upon completion of the operation restore the parts to a condition of normality? All thinking practitioners follow the latter course with the full knowledge that it is the only method which can bring comfort to the patient, the only method which does away with a condition of faulty environment, the only method which returns the teeth to their normal positions and permits the parts to return to their normal conditions. The men who carry out their operations with these things in view are the professional men in dentistry.

Dr. J. E. Rose, Vinton, Ia. I do not feel that I can add anything in the way of information to this paper that has not already been presented, but there is just one thought I would like to leave with this congress, which has helped me, and it is this: When we proceed to restore a tooth to its normal condition we should go about it with this thought in mind, that we perform the operation but once.

Dr. W. R. Clack, Clear Lake, Ia. I wish that such a paper might be read every week before every dentist in the world. I do not believe there is any danger of too often calling attention to the points brought out in this paper, and I

wish to leave a thought for those who are not already practicing what I wish to recommend. Where the approximal surfaces of the teeth have been lost through decay or otherwise, the first operation after cleansing that mouth is to take an impression of those teeth and of all the adjacent parts. It only takes a very few moments to get the modeling composition ready and to obtain the impression, and then lay that impression away. If there are any fillings to be removed that are defective or otherwise, probably lacking in contour, remove those fillings carefully, place them in their proper positions in the cast, thus obtaining a facsimile of the patient's mouth for comparison at a future date. Now place the teeth as nearly as is possible in their normal condition, probably not in the original condition, for it is possible that the normal condition did not obtain originally. It is the dentist's duty to obtain this separation that Dr. Wedelstaedt speaks of. The operation may be hastened by the use of a mechanical separator, plugging those spaces with gutta-percha and insisting that the patient masticate his food on the gutta-percha fillings. In a few months it will be found that the teeth have become sufficiently separated without any inconvenience to the patient. Then, after restoration has been made, insist on seeing the patient every few months, and take a number of impressions of the mouth at those different periods to show the change for the better in the environment of the teeth and the surrounding gum tissue.

Dr. G. R. Warner, Grand Junction, Colo. After the mouth is placed in a normal condition, as Dr. Bogue has described, it behooves us to keep it in that condition, and we cannot do it alone with our perfect contact points. We cannot do it alone with tooth-brushes, mouth-washes, etc., we have also the food to consider, as Dr. Bogue has said. So many people ask us why Indians do not have tooth troubles. They use the proper foods. The aborigines had no tooth troubles to speak of. If we should examine the cliff-dwellers' skulls we will find comparatively perfect mouths. But the people of today, as Dr. Bogue has said, live on soft cooked foods—foods that by the exertion of mastication do not cleanse the teeth, do not strengthen the gums and do not nourish the body. If we would instruct our patients to use the proper food we would not only help their teeth but we would also help the teeth of the coming generation. I simply want to emphasize this question of food; let us study it for the benefit of our patients.

Dr. F. L. Fossume, New York, N. Y. I recently had two cases, one a boy about twelve years of age, and the other a girl about nine. In both cases the first molars, upper and lower, were so badly decayed and broken down that they had elongated and were occluding into one another so as to make it impossible to restore the contour without opening the bite. I treated the boy first, and inserted amalgam fillings in the molars on the right side, removing the pulps from the lower one. I contoured the fillings so as to restore the cusps and original form of the teeth, using a quick-setting amalgam. When the operations were completed it was too late to carve the fillings to relieve the bite, and I therefore requested him to return early the next morning. He did not show up for a week, and when he came I found to my surprise that the two teeth had adjusted themselves and the occlusion was perfect. The amalgam fillings were not broken, not worn, and had probably set perfectly before he had masticated on them. I did the same thing on the left side, with the same result.

The little girl's teeth were also treated in this way and in a few days the teeth were in normal position. Had I carved the first two fillings the same day they were constructed I would not have discovered this point, which I consider most valuable.

Dr. R. C. Turner, Caldwell, Kan. I think Dr. Merriman has touched the keynote of the whole business. A few years ago I took a trip down the Canadian river and went among three thousand Indians. I examined the teeth of those Indians as far as they would allow me

to examine them, and I did not find a single carious tooth among all those Indians. They were meat-eating people. This dietary subject is a very important one in dentistry; that we all know. Here is the idea: these milling men that grind our wheat make it into white flour, taking away all the bone-forming substance. I think the question of diet is a very important one for dentists to consider.

Dr. J. H. RIGGLE, Port Washington, O. A very interesting case has been described in the course of this discussion. I refer to the building up of those first molars. I would like to know first whether those teeth were driven into their sockets, or did the readjustment within the glenoid fossa bring the articulation to that point? Did the anterior teeth move down to their proper occlusion, or was that accomplished by the lengthening of the hinge of the jaw?

Dr. FOSSUME. The change took place in the position of the teeth, for when I examined these teeth I found that instead of being so much longer they were in their normal positions in the alveoli. I believe the change that had taken place was simply a thickening of the pericementum, which was quickly reduced by the pressure of the occluding teeth, after being restored to their natural shape and size by the amalgam fillings.

Dr. C. H. LAND, Detroit, Mich. I have had considerable experience with irregularities in various ways, and believe the case referred to was one of malocclusion. My impression is that in many instances when in attempting to change the position of an individual tooth that has not quite reached its correct position we cement metal caps on one or more of the adjacent teeth it forces them down a little and the other short teeth will correct themselves. In this way I have regulated teeth for patients ranging in age from ten or twelve years to thirty-six. I find that even at the age of thirty-six years it is possible to force teeth into their alveoli. They give way in that direction as well as in any other by exercising sufficient pressure on a few individual teeth. I have a case now, that of a child of ten or twelve years of age, which will take me six months to correct, waiting for the incisors, canines, and bicuspids to extend.

Dr. J. A. TODD, St. Louis, Mo. As the question of the aborigines was brought up I can say that I have had some experience with the Utah Indians. They live on white bread, cooked potatoes, and other food of the same nature, and they have the same troubles with their teeth as the civilized people. They suffer from pyorrhea alveolaris and have their teeth extracted, for as it is they have nothing else done for the relief of their dental troubles. It is not because they are or are not Indians, but because they live in the manner of civilized people and eat the same kind of food that they have "civilized" diseases.

Dr. J. H. NICHOLSON, Ardmore, I. T. I wish to corroborate the statement made by the previous speaker, that the teeth of the Indians are subject to the same troubles and diseases as the teeth of white or civilized people when they eat the same kind of food and do not take care of them.

Dr. R. C. TURNER, Caldwell, Kan. Those were semi-civilized Indians I had reference to; they lived on meat. It was in 1893 that I saw them and they were in a semi-civilized state. But they were not living on potatoes, wheat, sugar, etc. The government issued meat rations each week, and they lived entirely on meat. They did not want flour or anything of that kind; they threw it away.

Dr. C. H. WORBOYS, Albion, Mich. The problem of taking care of the teeth is a considerable one. In regard to taking care of children's teeth I will tell you what I do with my own little ones. I have a boy and a girl. They still have their deciduous teeth. I feed those children nuts, and they must crack them with their teeth if they can. I believe the very best permanent set will result only from a thorough use of the deciduous teeth. I know of no better way of stimulating the organs concerned in the development of the permanent teeth than by a thorough use of the deciduous teeth. When their food is cut into little pieces

and the children are not allowed to make use of their teeth the very best for the future health of their teeth is not being done. In the case of the permanent teeth I do not believe there is a dentist practicing who is not familiar with the natural forms of those teeth. It is not only our duty to repair them by filling or any other method that we know of, but we are likewise bound to see that the teeth grow perfectly, and the best method I believe is to advocate the thorough use of the deciduous organs.

Dr. J. I. Hart, New York, N. Y. I think we all concur with what the last speaker has said as to the *proper* use of the teeth, but his suggestion as to permitting children or adults to crack the shells of nuts with their teeth I think is not good practice. If the teeth are used sufficiently we induce proper salivation and we get sufficient blood to the parts to secure healthy peridental membranes. But the crushing with the teeth of such hard substances as the last speaker has suggested, would be found to fracture the enamel, ultimately producing decay. I fully agree with the suggestion to use them moderately; but in putting the deciduous teeth to such use as has been mentioned there is great danger of forcing them out of their sockets and losing them before the proper time.

Dr. Worboys. In reference to what the last speaker said as to the danger of using those hard substances, permit me to state that any baby or little one will use no more force than is necessary to crack a nut, and if they have not muscle enough they cannot crack the nut, and any tooth in healthy condition will stand anything the muscles of the jaws will stand. If those muscles are strong enough to bring the jaws together I warrant you the teeth will stand it. If the tooth is decayed or filled it is not wise to use it, of course, but the exercise those deciduous teeth get in using them in that way aids the development of the coming teeth and strengthens the muscles, and it gets the young one into the habit of grinding the food instead of bolting it.

Dr. R. Ottolengui, New York, N. Y. I would like Dr. Worboys to reply to that criticism that the deciduous roots might be loosened by this process. When do they begin to lose their stability?

Dr. Worboys. As I said before, if a tooth is weak or tender the child will not attempt to bite hard on it, no more than any of us will try to lift a heavy weight if the arm is rheumatic or if the muscles are weak. You cannot make them overdo it. I do not think it is possible to get a child to use a tooth when the roots have begun to absorb to such an extent that they are likely to be a little bit loose. So far as getting the other teeth out of line from use when the roots have become absorbed, I do not think that is possible. The permanent teeth as a rule follow directly after them. In nearly all cases I have found that the bicuspids are developing almost in the center between the roots of the deciduous molars, and the support is greatest over them. It is not distributed on both sides. I do not believe you can force a growing permanent tooth out of line by the use of the deciduous teeth. I am so fully convinced of the advantages accruing from the active use of the first teeth that I teach my little ones to use them just as hard as they can, and when I find a good hard hazelnut they cannot crack with their teeth the rest of us will have to take a hammer. It produces a thorough development of the muscles of mastication. I do not know of any better way of getting blood to those parts than by just such a thorough use of the teeth as I have described.

Dr. Riggle. There is one thing in this discussion that has not been brought out, namely, when the roots of the deciduous teeth are being absorbed the other teeth are coming into place. The first permanent molar is already in evidence before the roots of the first or second molar begin to be absorbed. I heartily indorse what Dr. Worboys said. That is nature's way of keeping the teeth clean, firm, and healthy.

Dr. J. L. Howell, Creede, Colo. In the main I agree with Dr. Worboys, but there are one or two exceptions. We all know that the things we are taught when

we are young stay with us when we become old. I would not teach a patient of mine to crack nuts with his deciduous teeth or his permanent teeth, but I would teach him to keep up a healthy circulation by the proper use of a proper tooth-brush. I would advise his parents to feed him the proper kind of food, hard toast and tough beefsteak. A child uses his deciduous teeth in cracking nuts, which the gentleman says is the proper way to stimulate a flow of blood around the roots of the teeth, but if you allow him to do that when he is a child he will do it when he gets his permanent set of teeth. I have such patients come to my office; they tell me they have destroyed the enamel by cracking nuts and things of that kind. I tell them they must stop trying to do things with their teeth that nature clearly never intended. The Great Architect built our teeth for the proper mastication of food. He never intended us to crack nuts with our teeth, but did intend that we should use them in a proper manner in the mastication of our food. I will tell you a little incident. An expert happened into my college. He was a Malay with the finest set of teeth I ever saw in a human being. He had a masticating strength of 458 pounds. He would take a piece of the hardest granite and for a small compensation would show us what he could do with his teeth. He would crush it between his teeth. One of the molars was entirely gone. He said he would not crush harder than his teeth could stand. Those teeth were small but they were magnificent. However, he had ruined one of them. I would advise the proper use of the teeth in masticating food and the use of a good, hard tooth-brush, brushing the teeth downward, and to the child I would give brittle toast and food of that nature to eat.

Dr. Ottolengui. Dr. Worboys reported that he had his babies crack nuts with their teeth, another gentleman indorsed the same habit for his babies, and I hope before we adjourn we may get all the testimony possible on that subject. I hope the stenographer has got the statement down made by the gentleman in regard to the case of the Malay who could use 458 pounds pressure, and had only one tooth broken. It seems to me, that the real solution of this question of what food to eat, is to inquire to what class of animals we belong, and study the kind of food used by that genus. I would suggest to Dr. Worboys that nut-eating animals, such as the squirrel, have a totally different kind of tooth-structure from that of man. The gnawing animals have teeth which wear out at the incisive ends but grow out from the bottom. The identical tooth continues to grow just as our fingernails grow, and as the teeth of human beings are not constructed on that principle I do not believe we should allow children to crack nuts with their teeth.

Dr. Robin Adair, Atlanta, Ga. Inasmuch as we have digressed from the subject I will say a few words on "foods." I do not believe that the importance which dentists give to food is really necessary. When we consider the chemical analysis of our simplest food we know that from any of it we can take more building material than the human body can assimilate. I might refer to the Boer, who eats the coarsest food. The Boers have the poorest teeth of any civilized or semi-civilized nation of the earth. The tooth-brush is unknown to them. On the other hand, some of the savage races in the same country carry about with them a powder with which they scrub their teeth after every meal, and they have the best teeth in South Africa. It does not lie so much in the dentist telling us what kind of food to eat as it lies in the influence of the dentist to show us how under our present supply of food and condition of food to keep our teeth in the best condition possible. There are people who do not eat solid food and they have as good teeth as the aborigines ever had. I think the main idea is to show people the benefit of prophylaxis. I think the gentleman who read the paper had that same idea in his mind. The points so nicely brought out by the essayist are ideal and we should all strive to put them into practice.

Dr. Wedelstaedt, representing essayist (closing the discussion). There is

but one speaker to answer and, if I have understood him correctly, I desire to say that for many years I have been of the opinion that we as a profession were too enlightened to hear a man again say that in making operations in the approximal surfaces of teeth it was not necessary to gain separation. I made some remarks regarding this subject and I am here to defend my position. I do not consider it good practice for any man to make fillings in the approximal surfaces unless he has sufficient room in which to operate and to return the parts to a condition of normality. It is a poor practice for a surgeon to operate on unclean parts, and he does not do so. If he does operate on parts that are not clean, he knows what the results will be, and we also know what the results will be if operations are not made as they should be. The essayist fully set forth the irreparable harm which so often follows where no attention is given a study of conditions, and operations are made irrespective of them. I believe in making operations which will be a comfort to the patient and which will not invite disease. If operations cannot be made with this idea in view, it is better that they be not made.

(To be continued.)

NORTHEASTERN DENTAL ASSOCIATION.

Tenth Annual Convention.

(Continued from page 617.)

WEDNESDAY—*Evening Session.*

The session was called to order Wednesday evening, October 19th, at 8 o'clock by the president, Dr. Henry McManus.

The mayor of Hartford, in a brief address, welcomed the members of the Northeastern Dental Association to the city.

After the address by the mayor, Dr. GEO. L. PORTER, Bridgeport, Conn., delivered a very interesting and instructive lecture on "The Tragedy of the Nation," in which he spoke of the events leading up to the assassination of President Lincoln. Dr. Porter's lecture was profusely illustrated by the projectoscope.

THURSDAY—*Morning Session.*

The meeting was called to order by the president, at 11 o'clock.

The next order of business announced by the president was the reading of a paper on "Manual Training as Conducive to the Highest Form of Dental Education," by Dr. C. R. LINDSTROM, Boston, Mass. [This paper was published in full at page 439 of the April COSMOS.]

Discussion.

Dr. JAMES MCMANUS, Hartford, Conn. I think the essayist has presented a thoroughly philosophical and scientific paper such as we seldom have an opportunity to listen to. I am delighted with it, and I wish I could speak as highly of the paper and the essayist as he deserves.

While the paper is highly scientific I can only hope to say a few words from an intensely practical standpoint. I feel as Dr. Strang expresses it when he says that he is practical if anything, and I would like to become a second to him. I say I have tried to be practical. I have also tried in a little way to be theoretical and scientific, but unfortunately my brain is not of such a high order as that of some of my friends. Practically there is no question that in every walk of life

a man is a better prepared man if his hands are educated in some direction early in life. I remember a remark made to me by Dr. Atkinson—I did not get the whole idea until afterwards, however—when he spoke of playing the piano as being an aid to a man in practicing dentistry. He said that a person thus learned to use his fingers in a way which would prove beneficial to him in the manipulation of delicate instruments. This was especially true in the old days, before the introduction of the rubber dam, when everything was done with the aid of the napkin. A man held certain things with his little finger, so as to be able to use the other three fingers in a way to more readily accomplish certain operations; but now we have the rubber dam, which makes operations much more easy. Now, a man who is able to use his fingers to draw a sketch or cut a die will make a good workman in any branch. There is where manual training to my mind is so essential to the man going into dentistry. Many years ago I heard a college official say that they would rather have students who had never had any training at all than those coming from the office of a dentist. I listened to him because I had respect for the man, but I could not think as he did. I feel that every bit of instruction and experience that a young man gets in the laboratory and office of the dentist will fit him to better assimilate the college teaching, and be a better man for having had that experience in advance. I don't care how much education a man may have—and I approve of the higher education—manual training is absolutely necessary. Many of you may remember that before the Connecticut Dental Society meeting last spring a professor of Harvard advocated a high standard of admission. I do not believe in that. The A.B. degree and all other collegiate degrees are grand things to have if coupled to manipulative ability; but of what earthy use is a dentist with all his learning, if he cannot use his fingers? Dentistry, if it means anything, means that men must be able to do the ordinary work that the ordinary man requires. The majority of people who require the services of a dentist have to have teeth filled or substituted by artificial ones, operations for the performance of which manipulative ability is a *sine qua non.* Education is certainly most desirable—I wish I had more—I wish all dentists had much more; but the first and foremost requirement for the average practitioner of dentistry must be manipulative ability. That is what dentistry means. In the practice of dentistry the great majority have to work for a living, and will have to work for a living as long as they are in the practice of dentistry—have to fill teeth, extract teeth, make teeth, and know the use of their fingers—and for that reason manual training is most essential, and the sooner a man gets it, the better for him, and the more before he goes to college, the better.

Now, it may not be the idea of the leading men in dentistry in other countries, but the history of dentistry shows that the men who have amounted to anything in this country have all been good operators, done wonderful work, and the most of them were men who went into dentistry late in life, men who had been in other lines of mechanical work and had been workmen in the different departments of life. In short, men who had good manipulative ability and a manual training that enabled them to become good operators. How many men there are who have come into dentistry who had been watchmakers, had manipulative ability, and were able to take up dentistry and make famous dentists, and later became famous literary men as well. As I look back to the old days, there is another thing that militates against the men of the present day. We have most genial men come to us once a month and display a nice line of instruments adapted to all uses. Now, in the olden times when a man practiced dentistry he had to make his own instruments; had to know the use of the file, and understand how to shape and form his instruments, and in so doing they knew for what purpose they were to use them. In this way manipulative ability was developed to a certain extent;

but today we have men coming to us and showing us instruments made by manufacturers who study every need of the operator, and the dentist therefore loses the manual training he would gain in having to make his own instruments.

Dr. J. F. Dowsley, Boston, Mass. I would like to second the statement of Dr. McManus that high manual training is a most essential thing for the dentist of today. Not only in dentistry, but in every walk of life. The manual training schools in the cities are certainly realizing this, and are growing better. I understand that there is a law now on the statute books of Massachusetts to the effect that if a certain number of citizens in any particular town make a demand for a department of this kind in the public schools, the school authorities are required to organize it. Furthermore, that if fifty citizens will sign a paper requesting a branch of this kind in the public schools or in the night schools, the state is obliged to respond. I think that the boy should be and must be educated early in life to get the best results. What I mean is educated as to his eyes and hands. Dr. McManus referred to the boy learning to play the piano to assist in the training of his fingers. I think that is a very important point. If a boy practices the piano regularly, he will be greatly benefited even though he never learns to play the instrument. Not only that, but the eye is educated by the reading of the music.

I believe in the highest standard of education, especially in dentistry. I would like to see every young man entering college have an A.B. degree. I don't see any objection to a man having an A.B. degree if he is also a graduate from a manual training school. If he can enter the manual school and there receive a high-school education and at the same time get manual training, he is better equipped to enter a dental college than anyone I can imagine. His eyes, fingers, and hands are educated with his brain, and that is of so much more importance to the dentist. That is to say, that when he puts a probe into a hole he should know by the touch—the touch that only comes from early education—what is at the end of that instrument. Somebody said that manual training should not come later than twenty-two years of age. I think that is entirely too late. Take the case of the ball-player, for instance. If a ball-player were to start at twenty-two years of age he would never get into the national leagues—would never become a ball-player. The ball-player starts this training when he is seven years of age and practices it as he grows up. Those who have attended our national game know how wonderful it is to see the ball struck from the home-plate out to center- or left-field and the fielder looks at the ball and turns and runs, and when he turns again the ball is practically in his hands. That is education of the eye. Therefore I think the very best training for the dentist is to go to the grammar school or to the commercial high-school, and there receive his education. Then if he can enter college and get the A.B. degree he will be well equipped to enter the dental college. No other preparation I know of is so good.

Dr. D. Genese, Baltimore, Md. What we have heard clearly shows the power of impression on the mind in early days. I do not think we can commence too early to teach manipulative ability. However, I do not think that the ordinary manual training in schools, such as tool-making and the like, would be conducive to good handling of the mouth. Dr. McManus, speaking of piano playing being conducive to high manipulative ability, reminds me of a little incident I will relate in this connection which will further illustrate the power of impression on the mind in early days. My early training in dentistry commenced when I was about fifteen or sixteen years of age. Many years later, as a relief to the work of dentistry, I took up the violin. The strangest part of it was that in the positions where a relaxation on the strings was required to change the character of the sound, I could never relax the pressure on the strings with the left hand because of having trained the left hand to hold instruments steadily. This simply further shows the power of early im-

pression in the use of the hands. While I can use both hands with equal facility, still that wonderful impression of holding instruments tightly with the left hand remains.

Dr. N. Morgan, Springfield, Mass. While listening to the discussion I was thinking of a student I had in my office quite a number of years ago. He was thirty years of age when he became a student. He had been a watchmaker and had learned the use of fine instruments in so far that he was an expert in the use of the instruments of his trade. He came to study dentistry, and everything in the dental office and laboratory was almost as new to him as if he had never seen an instrument. During the months of his apprenticeship with me, working both at the chair and in the laboratory, he would often have some work to do and would come to me and say that he could not find the instrument or tool for that special purpose. I told him he must not look for what he wanted, but must learn to want what he could find; that he must learn to adopt the plan by which if he had a special piece of work to do, to know what he could do it with and not have to look for a special instrument for that piece of work, as is customary with the watchmaker. In our calling men must have originality to master the conditions and circumstances and adapt what they can find to a piece of work, not look for a special instrument for every piece of work; no one who is not a natural mechanician can ever do that. The child should be made to work along the lines of manual training, and this applies to dentistry as well as to other fields of human activity. As I said in my mention of the watchmaker using specific instruments for every piece of work, we use too many instruments in our profession; we have a special instrument for every piece of work, and we have many men who absolutely confine themselves to certain methods which they have been taught in the college or in private practice. A man can never be a success in our work unless he has original ideas, can adapt himself to conditions, and adapt his hands to the skilful use of the instruments required to perform the operations within his province.

Dr. A. J. Flanagan, Springfield, Mass. Just a few thoughts came to my mind as the discussion was in progress. Dr. McManus says he is practical but not scientific. He is mistaken in his use of the words, for nothing is practical that is not scientific, and if Dr. McManus is practical, he is therefore scientific. These terms should be handled with care. In the question of what is practical and what is scientific I think we make a great mistake in the use of the words—as much as in the use of the terms dead and pulpless teeth.

Dr. McManus also said that playing the piano makes the fingers nimble. Now, I know three gentlemen who are performers on the piano, two of whom practice dentistry and rarely ever touch the piano, and I frequently see these gentlemen sit down to play and every finger is very nimble; but the third, who is not a dentist, has to continually practice to render his fingers nimble, which would seem to indicate that the skill to play the piano comes from the manipulative use of our dental instruments.

This society is to be highly congratulated on the paper by Dr. Lindstrom. This is the second time we have had a paper on manual training before this society lately. At our Rhode Island meeting we had a paper along the same line by Professor Warner of Springfield. By the way, Professor Warner is taking special interest in men who are going to take up manual training for the purpose of entering the profession of dentistry, and gives all the information possible to these men to start them in the right line. The time is coming when all our schools, our grammar schools, all our so-called high schools, will be the colleges of the great mass of the people. I think the general trend of education is toward the development of our high schools and grammar schools, so that any man, no matter how humble he may be, or how placed in circumstances regarding his birth, can still have a chance to go up the ladder. Nowhere in the whole universe outside the United States, with perhaps the ex-

ception of Germany, will you find that thought, that great tendency to develop the common high schools to the standard of the university for the common people. I have listened many years to these thoughts on manual training, and it does seem to me that in the consideration of this question we put the cart before the horse. If the National Institute of Dental Pedagogics, those men supposed to be able to teach dentistry, will formulate some definite plan of so-called "preliminary" hand training, and will also bring forth another plan whereby students deficient in technical ability can be assisted later on in college life, something of prime importance will have been accomplished. If I were to speak as a prophet I would say, that time is to bring forth the idea that all dental colleges are not the same in the light of truth and dignity, and that there is to be a division as to their worth and standing; in fact, are we not now on the path to that end?

Dr. F. L. Fossume, New York, N. Y. The value of manual training is self-evident, but I have noticed in the colleges that although they try to develop clear mental grasp of dental operations, there is a lack of method in their efforts to train the hand in applying muscular force and in the control of the motor nerves. Every movement counts, for it will be found that the most skilled mechanics work with fewer movements than the man who cannot turn out as good work. The deliberate execution of every motion when working out a mental picture of the complicated operation to be performed, calms the whole nervous system and is requisite to successfully perform difficult operations. Aside from this, it is far easier for the patient to bear long and strenuous operations if the operator is free from jerky and erratic movements. I have tried this on my patients, and I have tried it on myself. When things do not seem to go as I would wish, and when the patient becomes a little nervous, then is the time for deliberate effort; each movement, however small, must be quiet and must count, and invariably harmony is quickly restored.

Dr. T. J. Barrett, Worcester, Mass. I should like to discuss the question from the standpoint of higher education, and will have to ask to be allowed a little latitude. I believe several of the colleges have manual training branches and assign special men to that particular work. But how many men entering the profession are entering with that in view? How many are invited to enter the profession by the colleges with that in view? And how many when they get in are instructed with that in view? I maintain that there is too much of the commercial spirit in dentistry and not enough of the practical and scientific, and the dental colleges are largely responsible for that condition. And that is why we have so many state laws regulating the practice of dentistry.

We have forty-five states which have laws regulating the practice of dentistry, and in twenty-eight or thirty states an examination by the examining boards is required after the student passes the college examinations. In these states the boards are responsible for the class of men coming into dentistry. In the states where examination is not required the colleges are alone responsible, and, gentlemen, I don't believe that the question of manual training is one that is being properly considered at the present time in the colleges. I feel that manual training is all well and good, and has a place, but it is beyond the present condition of things. In the National Association of Dental Examiners there are men who have fought for years to establish high preliminary entrance requirements; not in the matter of manual training, but in the matter of a common English education. And that is why dentistry is where it is today—the commercial side is predominant; and I maintain that the average dental college today is just as much a commercial institution as the dental parlors are. Many advertise as flagrantly as the dental parlors. Now, that is why I did not care to discuss the paper. I did not feel that I could discuss it favorably from Dr. Lindstrom's standpoint, as I don't feel that the time is ripe for that. I feel that having an average common

English education is the requirement that should be made of all young men entering the dental colleges. I feel that this association and others of its kind should fight for a higher requirement along the line of the ordinary English branches, and admit no one to the practice and study of the profession of dentistry until grounded in the rudiments of English, and whether or not we want to include manual training in that is a question for future consideration. We have fifty-five or sixty dental colleges, and among them we have many good ones. We have many men giving their time without ample reward, for the betterment of the condition of dentistry, sacrificing time which would bring them far better returns in their private practice; but on the other hand we have as many, and more, who are in the business of educating students for what there is in it for them, and while these conditions exist dentistry will not advance as it should.

Dr. Lindstrom (closing the discussion). I thank you for your kindly consideration of this paper. I know its weaknesses and I know I have exceeded my time in trying to express what I wanted to say. Still I have not expressed all that I wished to say, nor have I been able to follow out all the conclusions I would like to make, because it would have taken altogether more time than I had a right to ask. What remains to be said I have saved for another paper to come later. I have presented for your consideration only a few points as bearing on the question, in order to see if there may not be some possible way of remedying existing fallacies.

Dr. Barrett has brought out another side of the question, and Dr. Dowsley, speaking from his standpoint, recommends the standard of the A.B. degree for college entrance. I have talked with many men of our profession, both in this country and abroad, and I am convinced that intellectual culture alone does not produce the ideal dentist. We have had in our profession our proportion of intellectual men, such as Stockwell, Garretson, and a score of others I might mention; but these men do not live today to inspire us of the younger generation solely because of their mental abilities, but because we feel that they were truly manly men. What we need today is men, be they geniuses or not, who are not governed solely by the spirit of commercialism so prevalent in our present time—men who have acquired the delight of being useful. I have tried in my paper to show how this delight may be cultivated and must be planted in youth. The dental colleges should try to stimulate this spirit by means of ethical teaching, to offset the spirit of the purely selfish purpose. Such teaching could have no other effect upon the whole profession in the course of time. I do not wish to be regarded as finding fault with, or throwing cold water upon, our system of education, for it has made remarkable strides in the last few years. I doubt if in any other profession such progress has been made; but we do turn out still a pitiably large number of purely commercial men. Possibly one reason for this is to be found in the fact that so many of the teachers are in the colleges not from a love of teaching but for the reason that they believe their private practice will be greatly enriched by their holding college positions. A large proportion of people rate a man great and successful if only he has a position in some college or other. This spirit underlying the work of the teacher is contagious, and sooner or later the student rates his profession according to the fees he is known to receive in his practice. We must have teachers above this level if we are to bring out students of a better quality.

One of the biggest advertising men in Boston told me that he received his first inspiration to run such a business as he is conducting from the way in which the so-called free dental clinics were run in the colleges. He did not see why those same principles applied in private practice would not lead to quick financial success.

One more word and I have done. Someone has remarked that the work of the manual training schools is too heavy

and clumsy to be of any benefit to the dentist's touch. I can answer this only by saying that the gentleman cannot have visited the manual schools of our large cities, for nothing could be more delicate, more truly artistic, nor require a finer sense of touch than much of the work done in them.

I thank you again, gentlemen, for your courteous attention.

The subject of Dr. Lindstrom's paper was passed, and the next order of business as announced by the president was the reading of a paper by Dr. F. L. Fossume, New York, N. Y., on "A Plea for More Thorough Dental Asepsis." [This paper is printed at page 672 of the present issue of the Cosmos.]

Discussion.

Dr. L. C. Taylor, Hartford, Conn. I did not hear all of the paper, but I had the opportunity of reading an abstract of it, and from that I have gathered my ideas. This is one of the most important subjects before the profession today, because it is based on the fundamental principle of what is right, and I am glad to see a man who takes the position that we are responsible to our patients. We today are admitting into the practice of our profession too many who are irresponsible. They seem to want to do only what the patient wants done, and count that as their duty. We should hold ourselves responsible to our patients, and in so doing we must insist upon their coming to our terms. We must insist on getting a good fee for the work done in bringing about an aseptic condition of the mouth, filling teeth, prophylactic treatment, thus restoring the health, strength, and vigor of the patient. When patients tell us they have been going to a physician for eight years for the treatment of rheumatism, and then come to us to be cured, we can realize the good we do and the responsibility to our patients. Removal of the concretions which are carrying bacterial poisons to the system is of the greatest importance, and I want to say that I am delighted to know that New York has occasionally a man who holds himself responsible to his patients.

The essayist refers to our obligations to patients, regardless of the remuneration we receive. I admire him for the stand which he has taken in this matter, and I will venture to say that if he sticks to that standard he will some day be one of the great practitioners in New York. How many we see who are practicing wholly for the remuneration they derive, and how many doing only just what is demanded by the patient, regardless of their professional obligations! I believe in caring for our patients and endeavoring to bring about an antiseptic condition of the mouth, requiring our patients, if necessary, to come to us often enough to maintain this desirable aseptic condition. As a rule we are entirely too careless in making appointments. Many dentists when they finish an appointment, will tell the patient to "drop in some time soon" and let him look after the teeth again, and that often means many years. We should see our patients, at regular intervals, make a definite appointment for every one, two, or three months, and notify them of the appointment a few days before the time. In overlooking this we sometimes let years slip by without seeing our patient again. I had eleven years slip by in the case of one patient recently. We must keep regular appointments with our patients if we hope to bring about and maintain the proper aseptic conditions in the mouth.

Dr. Julio Endelman, Philadelphia. The subject of asepsis is frequently disregarded by teachers and practitioners. It has been my experience that only a limited number of dental schools are fitted up to carry on dental work upon aseptic principles. Furthermore, it is not only necessary to operate with sterilized instruments but it is likewise of the utmost significance to prevent infection of the soft tissues and saliva in the course of dental operations. It is a very common practice for dentists to excavate carious cavities without taking care that the débris removed from the cavity does not fall into the saliva, thereby contami-

nating the fluids of the mouth and possibly parts of the digestive tract. Another point of importance is the sterilization of the hands of the operator, as it is perfectly possible to transmit infectious diseases from one mouth to another through the hands. With sterilized hands and instruments the dangers of infection are very much decreased.

In a paper which I had the honor of presenting to the Fourth International Dental Congress, I called attention to the dangers of post-extraction accidents frequently produced by defective operative procedures and infected instruments, and described a number of fatal cases following the extraction of teeth directly traceable to unclean instruments.

Dr. A. C. Fones, Bridgeport, Conn. I am very much interested in this subject and am entirely in accord with all that Dr. Fossume has said. I would like to bring out just one point in the discussion. Dentistry has arrived at the point of excellence where it is possible by mechanical and surgical means to treat nearly all diseases of the teeth, but I believe now our efforts should tend in a wider direction. What are we doing in the matter of prevention? Most of the pathological conditions of the mouth are caused directly by the action of micro-organisms upon food débris. Either are harmless without the presence of the other. Experiments have shown that it is practically impossible to sterilize the mouth. Can we then so polish and prepare the surfaces of the teeth that the patient can thoroughly remove the food? I believe we can if we follow the treatment of prophylaxis as advocated by Dr. D. D. Smith. Dr. Hopkins of Boston has shown by experiments that the germs of pneumonia are present in practically all mouths, but to become virulent they are dependent on the presence of food. In other words, a person with a clean, sanitary mouth is rendered quite immune to pneumonia.

Dr. C. R. Lindstrom, Boston, Mass. Under the discussion of the subject of asepsis, I would like to ask what are the fluids of the mouth doing if not acting as preventives? Are they not helping to take care of these dangerous germs, and their resulting dangerous conditions? I firmly believe if the mouth is kept clean by brushing persistently with warm water, using perhaps occasionally, for the sake of getting greater friction, a powder practically free from all antiseptics, we can keep the mouth in a far healthier and more natural condition than by the use of all the known antiseptics of the present time.

Dr. T. C. Stellwagen, Jr., Philadelphia. I was very much interested in the paper, but I believe it is practically impossible to sterilize the mouth, more nearly impossible than it is the hands. In the matter of the sterilization of the hands Michaelovitch took up the study from a practical standpoint. In his experiments he found that in proportion as a man scrubbed his hands from five to ten minutes in that proportion he would have a lessened probability of infection. He found that the use of alcohol in sterilizing the hands meant nothing at all, but that it all depended on the scrubbing of the hands. Some of the best surgeons tell us that scrubbing can be depended upon as much as anything else. I did some experimental work along this line myself, and found that mercury bichlorid would not sterilize the hands. In one instance I kept my hands in a bichlorid solution for four hours, until blisters had developed, and epithelium scraped from the hand at the end of that time would produce infection in every case. This proves that it is impracticable for the dentist to thoroughly sterilize his hands. I also experimented with the use of rubber gloves, and I found that the gloves rendered one more liable to carry infection than without. Now, that is the condition we have to meet. I think every man who will make a study of this idea will have to agree that friction, scrubbing, and taking care to scrub in the folds of the skin, is the most practical method of sterilization. In that way we can eliminate to the very lowest degree dangerous infection. Ordinary chemical germicides do not suf-

fice. In fact I believe it has been proved that when the mouth is put in as sterile a condition as possible the diplococcus of pneumonia is found in the sputum, but this diplococcus of pneumonia is not virulent until the conditions are produced favorable for its activity. I do not believe it is possible to thoroughly sterilize the mouth, but we can reduce the liability of infection to the very lowest degree by the use of the brush and scrubbing, which is I think the best method we have.

Dr. C. F. Bliven, Worcester, Mass. I believe it is possible to sterilize the mouth, but not by any of the present methods. We know that moisture is necessary for the development of bacteria. As the mouth is always moist, it must furnish ideal soil for bacterial growth. Bacteria enter the mouth with the food, air, water, etc. To control their growth we need to realize the importance of knowing how to live—the composition of the food, the classes of food, and the action of the digestive fluids upon the various kinds of food. I would like to touch only upon the importance of the salivary digestion. It is too often overlooked. Not one man in a hundred masticates his food properly. Without thorough mastication the saliva is not incorporated with the food, and it consequently passes on impervious to the action of the gastric juices. This food, not being rendered soluble, is not further digested in the stomach, and lays there until it undergoes putrefaction. As putrefaction is the result of bacterial growth, here is an ideal soil and condition. Can we reasonably expect aseptic mouths with such alimentary conditions? If our food be well masticated, other things being equal, perfect assimilation and absorption must follow, thus leaving only an ash for the residue.

Dr. A. C. Fones. Professor Miller has found that in some persons after the mouth is rendered clean and sanitary the percentage of germs in the feces is decreased from thirty per cent. to three per cent. I believe such conditions are due entirely to the unclean surfaces of the teeth, and a man who will practice prophylaxis and keep the surfaces of the teeth highly polished with the orange-wood stick and pumice, so that the patient can thoroughly brush the food particles off, will develop a condition of health unknown to him if he has not already tried it.

Dr. Stellwagen. I believe that if our food is properly prepared and properly triturated, that will go a long ways toward the proper cleansing of the mouth, as it keeps the pockets where the food collects washed out. If we did reach a state of sterilization in the mouth digestion could not go on properly. Many forms of bacteria are essential to certain phases of digestion. And so I do not see the advisability for absolute sterilization of the mouth. A large part of the digestion in the large bowel is carried on almost entirely with bacterial aid. We cannot separate the good from the bad, and therefore I question very much whether it would be advisable, if possible, to bring about a condition of sterilization. I think the suggestion of having the teeth so thoroughly polished that the patient can easily remove all collections from them is the only practical solution of the problem.

Dr. Fossume (closing the discussion). This discussion has broadened to such an extent and in such manner that it would take too long to answer all the points raised, nor are all the points pertinent, so I will only take the subject up briefly and concisely. Of course, the old question of nomenclature has been touched upon. Absolute sterilization of the oral cavity is, to my mind, and I presume to the minds of all of you, an impossibility. I said that we should use all the means within our power to keep the mouth in a reasonably sweet and clean condition, and that the surfaces of the teeth should be sterilized. The sterilization of the surfaces of the teeth is not a difficult matter. Many patients come to us with erosions or disintegration of the surface of the enamel in its early stages. If we slip on the rubber dam and polish this surface, and in fact the whole tooth, neutralize any acid condition with bicarbonate of soda, and mas-

sage the surfaces of the whole tooth with orange-wood sticks and 40 per cent. solution of formalin, the teeth will lose in one treatment almost all of their sensitiveness, and I know of many cases where decay has permanently disappeared. This is practical dental prophylaxis. The average practitioner is doing his whole duty when he practices conscientiously. Scientific research in its higher stages comprises a field by itself, and it requires a mind especially trained and a temperament peculiarly qualified. Those working in this field will no doubt some day give us a method by which the mouth can be put in a far more sterile condition than is now possible. Dr. Bliven touched upon the general health of the system, and one other gentleman suggests that perfectly healthy mouths do not need prophylactic treatment. This is true, of course, but how many people have such mouths? There is no question that practical attention to hygiene and the general health does much to establish health and prevent the loss of teeth, and while the general condition of the system is to be taken into consideration, it is too large a topic for the present moment, and it would be useless to discuss this phase of the question now. Another speaker referred to preventive treatment. I refer to the practice of the method in its highest sense, that is the prevention of caries; but when teeth decay we have to fill them in the best manner possible, and in such a way as to free the mouth as far as possible from any chance of infection and the harboring of dangerous germs, by attending to all places in the mouth where these accumulations are likely to take place, and the polishing of the surfaces of the teeth in such a manner that they can readily be kept smooth. No one would rely on antiseptic mouth-washes to remove deposits of tartar.

With regard to an absolute sterile condition of the mouth, I have never seen or heard of a man who claimed to obtain and maintain such a condition.

We all desire success, and wish to deserve it, and we can attain that success by treating our patients in the most conscientious manner possible. Our responsibility to our patients and to ourselves is a dual one. That involves the commercial side of dentistry, and I know it is not good policy to bring the commercial side before a scientific body, but at the same time a man should be remunerated according to the demand made upon his time, and according to how he uses that time. I believe that a man's *clientèle* regulates his fees, and if his time is filled to such an extent that he cannot give every patient the necessary amount of time, he should refer those cases which requires the lesser degree of skill to an assistant, rather than to hurry through with the work. If he is hurrying in this way, he is not doing the best work possible. For this reason I think we should look on the subject from all sides, and try to be successful professionally, as well as financially. Conscientious attention to the former will insure the latter.

On motion the subject of Dr. Fossume's paper was passed, and the meeting adjourned until Friday morning.

(To be continued.)

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EDITORIAL DEPARTMENT.

ANOTHER VIEW OF IT.

ANYONE not otherwise informed upon the subject and who derived his data solely from a perusal of the discussion brought out by the reading of Dr. Lindstrom's paper before the Northeastern Dental Association, as published in this issue, could scarcely escape the conclusion that all of the ills of ignorance and selfishness that afflict the dental profession are directly caused by our dental colleges and their modes of education. "There is too much of the commercial spirit in dentistry and not enough of the practical and scientific, and the dental colleges are largely responsible for that condition. And that is why we have so many state laws regulating the practice of dentistry." "The average dental college today is just as much a commercial institution as the dental parlors are." "We have fifty-five or sixty dental colleges, and among them we have many good ones. . . . . On the other hand, we have as many and more who are in the business of educating students for what there is in it for them, and while these conditions exist dentistry will not advance as it should."

The indictment is a severe one and comes with added force as the utterance of a member of the State Board of Examiners of Massachusetts who is also president of the National Association of Dental Examiners. The same speaker states that "We have forty-five states which have laws regulating the practice of dentistry, and in twenty-eight or thirty states an examination by examining boards is required after the student passes the college examinations.

In these states the boards are responsible for the class of men coming into dentistry. In the states where examination is not required the colleges are alone responsible." According to the above it is clear from the speaker's own data that the examining boards are responsible for the proportion of two-thirds of the men coming into dentistry and the colleges one-third, a very fair majority for whose ethical sins and commercial spirit the examining boards appear to be responsible.

But there is a still further factor in the proposition that the speaker failed to touch upon, viz, not all of the men examined by boards are dental college graduates. The dental law of Massachusetts, of which the speaker quoted is one of the executives, permits anyone who has the fee to apply for examination regardless of where or how he obtained his education, and he may pass if he can. Not a few other states make the same provision, and we are not aware that any pledge of ethics or non-commercialism is exacted of the applicant, nor is any means taken to discover what his ethical standards have previously been or are likely to be as a practitioner. The law so far as we are aware will not undertake to prohibit commercialism in a dental practitioner, and therefore the executives of the law are powerless to exclude an applicant on that ground and must concern themselves solely with the question of his technical professional qualification. From the point of view of the critic of the colleges it is possibly a wise provision of the Massachusetts dental law that men do not need to take a dental college course in order to pass the board of examiners of that state. It provides a means of escape from the baneful influence of the commercial spirit and unethical methods of which he complains; but does it not open the way to still greater abuses? Is it not a fact that schemes for the teaching of dentistry by the correspondence method are advertised or have been advertised throughout Massachusetts, by which the promoters of the scheme profess to prepare men under a guarantee to pass the examinations by the board of that state? And is it not also true that for a consideration of one hundred to one hundred and fifty dollars men are to be found in Boston who will undertake to fit candidates in one year to successfully pass the Massachusetts Board, and make a contract with a guarantee attachment to that end? The college may have its defects, but when men are prepared by a memory-cramming process so that they can secure a license to practice dentistry, and are thereby legalized as practitioners having the same rights and privileges as the man who has spent three full years in training even under the minimum standards of the Faculties Association colleges, it would seem that the burden of responsibility for low professional standards should not be borne wholly by the dental educational institutions.

We admit that this is a *tu quoque* form of argument that does not in the slightest degree relieve any or all of the colleges from the responsibility of answering the charge of commercialism or of fostering unethical conduct in their graduates if the indictment which we have quoted is a true bill.

But is it a true bill? It would be interesting to know just what our critic means by commercialism and unethical conduct upon the part of colleges, and how he knows that there are as many men engaged in the pursuit of dental education as a profession for "what there is in it for them" as there are of men who are in it for higher, altruistic motives. The study of commercialism in dentistry raises some interesting questions from the professional standpoint which would be more easily solved if we had a satisfactory definition for commercialism in that relation. Perhaps the college critic will solve this problem and do his professional colleagues a service by defining it. Such a definition should show that the professional man is not practicing dentistry for what there is in it for him but what there is in it for his patients; and, to make it square with the work of that other class of educators of whom the critic speaks approvingly, he should show that there are practitioners to the proportion of fifty per cent. of the whole body who are "giving their time without ample reward for the betterment of the condition of dentistry." The difficulty of making these altruistic ideas square with the facts in the case is the main obstacle toward formulating a rule which will exclude commercialism in all of its forms from the practice of dentistry, or of medicine either, for that matter.

What is the real cause of the difficulty? We are of the opinion that it is farther back than the examining board or the dental college, and that it is to be found in the system of preparatory education through which the youth passes before he attempts to fit himself for the practice of dentistry. Those who discussed Dr. Lindstrom's paper seemed to miss the real point of it in the majority of instances, by regarding manual training as a specialized kind of shop work intended to develop finger skill, with incidentally some value as mind training in precision and accuracy of observation and of logical thinking. We have frequently pointed out that manual training is essentially mind training through the perceptive faculties, and that finger skill is an incident, not the end, of that system. The defect in our systems of preparatory education is that they are mainly systems of memory cramming—an overloading of the brain with abstract ideas not originating in experience. The student is not brought sufficiently into contact with the realities of life, the eternal verities of existence, and his mental energies are expended mostly in the effort to remember and not in the ability to know. He has never been taught the inevitableness of natural phenomena and therefore fails to grasp the truth and honesty of nature in its concrete manifestations. He learns about truth and honesty by precept—by what others have told him about it—and unfortunately he is continually confronted with examples of the fallibility of human conduct which shake his faith in the correctness of these abstract standards. At an average age of eighteen years the novitiate undertakes the study of dentistry with habits and ethical standards more or less fixed. The influence of the home, the school, and social environment have made their impres-

sion with almost indelible effect upon his mind and character, and perhaps for the first time in his life he is brought into contact with the details of a pursuit which demand perhaps as much as any other, and more than most others, uncompromising accuracy and honesty in their performance.

Anyone having any practical acquaintance with the details of the system of dental education now in vogue knows full well that its every tendency and influence is in the direction of honest, accurate work. More than that, if there is a dental educational institution in the United States or elsewhere in which professional ethics and professional rectitude are not aggressively inculcated by precept and by example we are unaware of its existence. Considering the character of the material which under existing circumstances the colleges are obliged to accept, the wonder is that they turn out such a good product as they do. Complaint is made that the dental colleges do not demand a good average English education. Let the complaint be made to the proper sources, for if the dental college matriculate is lacking in a good English education it is because our American high schools do not furnish it.

It is not the intent of this critique to ignore in any particular or degree the defects of our dental educational system, for there are defects and these are being eliminated as rapidly as conditions will permit; but we do emphatically protest against such unjust and wholesale denunciations of American dental colleges as we have here quoted. The colleges will select better qualified men just as soon as they can get them. The demand is for a higher entrance standard; but no one has yet defined what is a higher entrance standard for dentistry. Practical experience in dental education has clearly demonstrated that an arbitrary fixing of the standard at the attainment of a college A.B. is not in a rational, practical sense an elevation of the standard for entrance upon dental professional study. Both examiners and faculties agree in the desire and purpose to elevate the entrance standard, and when the former has made a practical suggestion to that end it has had the concurrence of the teaching bodies. But all advances to be of use and permanence must be in the line of adapting means to ends and must be the outgrowth of wisdom based upon experience. No advance is made in dental education which originates in emotionalism or is initiated by calling hard names. Let the specific instances of college commercialism be dealt with as individual cases and not by a general indictment of the entire system, which even with its weaknesses and defects is still the best we have, and which has accomplished results of which, on the whole, the dental profession as well as the world at large has every reason to feel proud.

BIBLIOGRAPHICAL.

DENTAL SURGERY FOR MEDICAL PRACTITIONERS AND STUDENTS OF MEDICINE. By A. W. BARRETT, M.B. (Lond.), Member Royal College Surgeons, Licentiate in Dental Surgery, England. Fourth Edition, with illustrations. Philadelphia: P. Blakiston's Son & Co., 1905.

This work, intended exclusively for the use of practitioners of medicine, embodies a discussion on the structure of the teeth and of the diseases of these organs most frequently encountered in the practice of dentistry and necessarily in that of medicine.

The thirteen chapters into which the book is divided embrace the following subjects: Chapter I: The Teeth Generally. Chapter II: The First Dentition. Chapter III: The Second Dentition. Chapter IV: Abnormalities in Development of the Permanent Teeth. Chapter V: Irregularity in the Positions of Permanent Teeth. Chapter VI. Dental Caries. Chapter VII: Toothache. Chapter VIII: Tartar; Pyorrhea Alveolaris; Absorption of Alveolar Process. Chapter IX: Injuries to the Teeth. Chapter X: Preparation of the Mouth for and the Wearing of Artificial Teeth. Chapter XI: Anesthetics, General and Local. Chapter XII: Mechanical Treatment of Fractures of the Maxillæ. Chapter XIII: Extractions of Teeth and Stumps.

Scattered throughout the book are a number of statements which, at least from a purely dental standpoint, must be characterized as erroneous, and which while they might be accepted by the medical practitioner not familiar with the pathology and therapeutics of this special branch of the healing art would not be countenanced by the dental clinician to whom the conditions to which we have reference are matters of common knowledge. As an instance of this we point to page 8, where we find the statement that the gum in the case of pathologic dentition should be lanced only "when it is quite evident to the sense of touch that the cutting edge of the new tooth is bound down by the tense and fibrous gum." To this statement the reviewer decidedly objects, for the reason that it is a well-known fact among dentists that relatively often the gravest type of reflex nervous disturbances develop in infants upon whose gums no sign of turgescence or impingement by the erupting tooth can be detected. On page 30 the recommendation that certain teeth, the upper and lower first bicuspids, be extracted for the correction of dental irregularities if they be "well developed and free from decay," is absolutely in opposition to the teachings of orthodontia and to the conservative trend of modern dentistry.

From the author's slight allusion to the treatment of irregularities we gather the impression that he is unmindful of the fact that the removal of teeth from the arch while it may be conducive to regularity in the alignment of the remaining organs always produces malocclu-

sion. To recommend the correction of crowded front teeth by the "symmetrical" extraction of the first molars, a procedure in which to all appearances the author thoroughly believes, exemplifies the empirical teaching of years gone by and not the modern—that based upon a scientific understanding of the causation of such abnormalities.

The description of the process of replantation is deficient in the sense that all reference has been omitted, to the necessity of removing the contents of the pulp-chamber and root-canal and filling of these spaces with a suitable material, if we are to prevent the development of infectious processes in and about the alveolus.

The author's opinion with reference to the use of chloroform in connection with the extraction of teeth when hyponitrous oxid is contra-indicated is certainly one which would not obtain among dentists, at least not among those of the American school. If nitrous oxid with a record of one fatal case per 350,000 be contra-indicated, chloroform with the appalling record of one fatal case per 2000 is certainly not a fit or safe substitute.

Regarding the use of cocain, the solution which the author recommends is entirely too strong. A preparation of "a quarter of a grain of the hydrochlorate of cocain" in four minims of water, as recommended by him, is equivalent to about a 6 per cent. solution. It has been found that the desirable degree of insensibility of the pericementum can be obtained with 1 per cent. solutions, at the same time decreasing markedly the probabilities of toxic after-effects.

The nomenclature adopted by the author is not the one generally accepted by modern writers upon dental subjects. "Stump" for root fragment, "fang" for root, "decay" for caries are a few examples of the antiquated terminology which prevails throughout the volume.

While it is probable that the book will be of some value to medical practitioners, its usefulness might have been greater were it free from such errors as we have pointed out and others equally significant. J. E.

REVIEW OF CURRENT DENTAL LITERATURE.

Conducted by JULIO ENDELMAN, D.D.S.

[*La Défense Médicale*, Bordeaux, March 1905.]

POTASSIUM IODID IN THE TREATMENT OF SYPHILIS.

Wallace of Dublin, in 1836, was the first to experiment with potassium iodid in the treatment of syphilis, and called the attention of the medical profession to the benefits to be derived from this agent in combating the affection. Ricord was, however, the clinician who first recognized its value in arresting the manifestations of the tertiary stage of the disease. Since then, says Professor Fournier, potassium iodid remains the undisputed factor in the therapeutics of syphilis, opinions to the contrary notwithstanding. Dr. Bizard, in an interesting communication to the Société Médicale du IXe Arrondissement, at a meeting held in April 1903, pointed out the disadvantages of this agent and pronounced himself decidedly against its promiscuous employment. It gives rise to a number of disturbances which while, as a rule, of benign nature, cannot

however be entirely disregarded. Among these may be mentioned coryza, acne, and the extremely disagreeable metallic taste of iodin and its compounds. Other accidents which are known to occasionally follow the internal administration of potassium iodid are of sufficient importance and severity to constitute a serious argument against its use. These are the iodic grippe (a series of symptoms simulating an attack of the grippe), cephalalgia of the neuralgic type, sialorrhea, conjunctivitis, iodic purpura, gastro-intestinal disorders, etc. Slightly dangerous as these symptoms may be considered, they are, however, of sufficient significance to contraindicate its employment, particularly in view of the fact that potassium iodid is not *per se* sufficiently active to arrest the progress of the malady.

Reviewing the action of potassium iodid upon the syphilitic infection, it is stated that it cannot be considered a specific inasmuch as at the beginning of the attack it is of little avail. At the utmost it will counteract, but up to a certain degree only, the phagedenic tendency of the primary lesion. But, as the phagedenism does not in any way complicate the prognosis, it must be definitely admitted that potassium iodid is practically of no value in the primary stage of syphilis. It is likewise ineffectual in the treatment of the secondary manifestations. It does not prevent alopecia; it does not act upon a number of the late accidents of the second period and early manifestations of the third, such as palmar and plantar syphilides, psoriatic syphilides, and onyxis. It has also been known to aggravate laryngeal syphilides and favor the cancerous degeneration of bucco-lingual leukoplakia. Potassium iodid is however of value in relieving the pain concomitant to the secondary manifestations, such as cephalalgia, osteocopus, arthralgia, myalgia, as well as the accidents of cardio-vasculary and pulmonary sclerosis.

It is in the tertiary stage of the malady that potassium iodid plays a truly remarkable rôle. Its action upon the gummatous manifestations is short of marvelous, but again is worthless in the treatment of tuberculous syphilides, lingual sclerosis, and visceral sclerosis. It has no influence upon the parasyphilitic lesions; when administered during gestation it does not prevent the infection of the fetus or abortion, but on the contrary establishes in the mother a tendency to hemorrhage.

Administered to the syphilitic new-born it only increases the specific coryza which so markedly interferes with the feeding of the infant.

The combined administration of mercury and potassium iodid is not to be recommended, as the iodid diminishes the action of the mercury. Mercury alone if administered for a sufficiently long period of time will bring about a cure regardless of the administration of any of the so-called antisyphilitics.

[*Boston Medical and Surgical Journal*, April 13, 1905.]

CANCER ABOUT THE MOUTH. By Frederic C. Cobb, Farrar Cobb, and Channing C. Simmons.

The authors report a series of ninety-two cases of cancer involving the mouth, observed at the Massachusetts General Hospital from January 1892 to January 1900.

In general it may be said that cancer of the mouth is not a hopeless disease. Eighty-three of the ninety-two operations were traced. Of the patients who underwent operations 16.3 per cent. were cured and 8.5 died from the operation. The remaining cases lived an average of two years after the operation. Lothrop and Scannell summarize the results obtained at the Boston City Hospital, as follows: First, the mortality of patients suffering from carcinoma in and about the buccal cavity is extremely high, at least 90 per cent. All unoperated patients die sooner or later of the disease, barring intercurrent affections. The duration of life of operated patients as compared with those not operated is in favor of the former by an average of about three and a half months. The comfort of the individual is distinctly increased by some sort of surgical intervention. Such relief may be either mental or physical. An early diagnosis of malignant disease about the buccal cavity is of the greatest importance and a moderately radical excision of parts offers the greatest hope of a radical cure, commensurate with the comfort of the patient and the immediate risk of life. Where there is extensive invasion of the parts, excision should be undertaken solely with the idea of palliation, without too serious interference with physio-

logical function and without too great immediate risk. Codman is of the opinion that the X ray causes superficial cutaneous cancers to disappear and that it may interfere with the progress of deeply seated cancers. He believes that it is the most hopeful treatment after operation has failed.

[*Medical News*, New York, May 6, 1905.]

RESEARCHES IN HEMOPHILIA. By H. Sahli.

The author (*Zeitschrift fur klinische Med.*, vol. lv, Nos. 3 and 4) has studied the peculiarities of the blood in this strange disorder. According to some the conditions are due to high blood pressure, but this is improbable, since diseases commonly associated with high blood pressure, such as chronic nephritis, do not usually run with hemophilic symptoms. In the author's cases, the figures obtained with the Riva-Rocci instrument, were normal or below normal. Microscopical examination of the blood showed only a moderate, relative diminution of polynuclear leucocytes, with relative increase of lymphocytes. The absolute number of leucocytes was normal or diminished. In two cases the platelets were also counted repeatedly, but their number was never above normal. The alkalinity of the blood, the dry residue of the serum, the depression of the freezing point, and the amount of fibrin in the blood were not altered. The time of coagulation was most carefully estimated and it was found that in the intervals in the hemorrhages clotting was much delayed, but normal or even hastened during severe bleeding. Very little can be done for the disease except to improve the general constitution. The local hemorrhages are best controlled with compression, gelatin, and adrenalin, but the latter two drugs should never be injected subcutaneously. There is as yet no drug from which good results can be expected from internal administration.

Internal administration of calcium chlorid in small doses for the treatment of hemophilia has been repeatedly recommended, especially by Mr. C. Edward Wallis, who in a paper on the subject in the August 1902 issue of the *Journal of the British Dental Association* reports upon a number of cases successfully treated by himself with this compound. Mr. Wallis has administered it in doses of ten grains thrice daily, increasing the amount to about fifteen grains taken as before stated.

[*New York and Philadelphia Medical Journal*, April 22, 1905.]

NASAL OBSTRUCTIONS AS A CAUSE OF DISORDERS OF NUTRITION. By Percy Fridenberg, New York.

The author believes that diseases of the gastro-intestinal tract and of the upper respiratory tract, caused by obstruction of the nasal passages, have received but insufficient notice from clinicians and investigators.

When we remember, he says, how important a part taste and appetite take in digestion, and the rôle played in degustation by the nasal mucosa, we shall not be amiss in alleging that the nose stands at the beginning of the gastro-intestinal tract as an accessory if not as an integral part physiologically of the digestive system. The symptoms which follow impairment of olfaction are alteration of taste, insipidity, unpalatableness of food and with it loss of appetite. The cause of these symptoms in a milder form is apt to be overlooked when due to chronic nasal disease. The sense of smell is important not only for digestion and appetite but as a guard against deleterious elements. It may lead to a marked blunting of taste, causing lack of discrimination of diet, eating spoiled or badly cooked food, and the abuse of spices and condiments.

The subject of infant feeding has been generally considered exclusively from the standpoint of the chemical constitution and nutritional value of the mother's milk and its various substitutes. There can be no doubt, however, that the large percentage of digestive disturbances in nurslings is caused by a faulty method of taking nourishment, and not to the composition of the nourishment itself. The child at the breast requires for the ingestion of a single meal about one-quarter to one-half hour; if nasal respiration be normal the infant will swallow no air. A strong negative pressure of from 50 to 140 cubic centimeters of water is produced which stimulates the secretion of gastric juice and causes a certain amount of fatigue, so that the child falls asleep without crying and vomiting.

Nasal obstruction or any allied condition leading to mouth-breathing is deleterious in two ways. It interferes with respiration and

interrupts the process of feeding and swallowing. The little one fails to breath through the nose and, suffocating, sucks spasmodically with frequent stops for breath, gasps, strangles, gulps air, and later vomits. These symptoms are almost pathognomonic of nasal obstruction due to adenoid growth. Either an insufficient amount of nourishment is taken, or large quantities of milk mixed with air are swallowed instead of the milk entering the stomach a little at a time. In young children similar causes lead to somewhat similar effects modified by the fact that solid food is ingested and thorough mastication is wanting. Bolting of food and gobbling, so often attributed to greediness or haste, are due in certain cases to the necessity of getting air and food through the same portal.

The author next reviews the change which occurs in the jaws and teeth as the result of mouth-breathing. The occlusion is abnormal, the teeth cannot perform thoroughly the work of mastication, are difficult to clean because of their crowded position in the arch, and caries soon follows. This again becomes the cause of indigestion and malnutrition. Mouth-breathing affects deglutition in two ways: The bolus under these circumstances is not sufficiently comminuted and softened by mastication, and insalivation. The necessity of getting air is responsible for the bolting of food, with disturbances in esophageal action, "swallow the wrong way," hiccough, regurgitation and the like. An artificial aid to deglutition is then found in drinking water for a substitute of chewing not only to soften the bolus, but also to act as a mechanical aid to deglutition.

Nutriment thus insufficiently prepared, largely diluted with water and mixed with air in the buccal cavity is digested with difficulty and is likely to cause gastric and intestinal disturbances. This morbid process may be further encouraged by the entrance of the products of purulent inflammation or mucous hypersecretion into the stomach from the nose or pharynx by gravitation, or from the larynx or trachea or even from the bronchi and lungs by swallowing after expectoration. The morbid processes will persist for a time even if the causes, mouth-breathing, insufficient mastication, and the like have been removed. When the latter have been present for some time the vicious circle has become habitual. It is not sufficient to correct nasal deformity, to remove adenoid and tonsillar hypertrophies, to do away with mechanical obstacles. These procedures, however radical, give the possibility alone of nose-breathing. They, by no means, insure it. Until habits of respiration and mastication are taught to be performed normally and thoroughly, each in its own province, mouth-breathing will continue in spite of a permeable naso-respiratory tract. This is particularly noticeable in children who have been operated on for adenoid growths. As they have never learned to breath through the nose they will continue to be mouth-breathers until they have lost the old habit and acquired the new one. Prolonged and thorough mastication is an invaluable aid in this training and in the author's opinion at least as important as respiratory thoracic gymnastics. The author advises that children be allowed, or rather encouraged, to chew gum until the nasal respiratory habit has become established. Cold sponging of chest and back, physical exercise, singing or reciting, and occasionally the use of a respirator or chin bandage at night are further aids to nasal respiration. Special attention should be paid to the posture of children while at the desks, so that anything may be avoided which encourages a crouching body, collapsed lungs, bent back, folded arms and lowered head. Among such factors are badly printed books, small type, insufficient illumination, the habit of reading on into the dusk without light, and simple sluggishness.

[*Archives de Stomatologie*, March 1905.]

CHANCRE OF THE GUM. By Dr. Chompret.

The author reports the case of a married woman presenting upon the gum at the level of the upper right incisors an ulceration of fifteen days' standing. It was of the painless type, without borders, with a grayish background and surrounded by a red band. There was slight adenopathy in the right submaxillary region. The teeth were normal. It was not possible to discover the cause of the infection, although Dr. Chompret was positive regarding the correctness of his diagnosis, the lesion being, in his opinion, the typical chancre as it develops upon otherwise healthy gum tissue.

[*Le Monde Dentaire*, Paris, March 1905.]

RESECTION OF THE LARYNX UNDER COCAIN.

Wreden (*Roussky Vratch*) reports a case of cancer of the larynx requiring the complete resection of the organ. The operation was performed successfully under the influence of cocain anesthesia. The substitution of general anesthesia by local anesthesia in these cases is desirable, because of the frequency of post-operative pneumonia in those cases operated under the influence of the general anesthetics.

Shortly before the operation a hypodermic injection was made of 1 gm. of a 1 per cent. solution of morphin to which .0012 gr. of scopolamin was added. After performing a tracheotomy the larynx was removed by the method advocated by Billroth. Injections of 1 per cent. cocain solutions were made in the muscles as they were being sectioned. Twelve syringesful of cocain solution were required and the operation was absolutely painless.

[*New York and Philadelphia Medical Journal*, New York, April 22, 1905.]

CASES OF MENORRHAGIA FOLLOWING THE EXTRACTION OF TEETH. By A. A. Anoufrieff.

The author reports (*Roussky Vratch*, February 26, 1905) a rather unusual case of menorrhagia in a married woman aged twenty-five years, unipara, who was seized with extremely violent bleeding from the uterus soon after the extraction of some dental roots, under chloroform anesthesia. She was brought to the hospital in a state of acute anemia. A great variety of remedies were given, including ergot, strychnine, etc., internally and tampons saturated with various solutions as packing. Finally the uterus was curetted, a hot douche given, and a strip of gauze saturated in adrenalin solution was inserted into the uterus. Even this did not act immediately, but finally arrested the hemorrhage for twenty-four hours, when the treatment had to be renewed so far as the packing was concerned. The scrapings showed the presence of chronic follicular endometritis. The author calls attention to this case as illustrating the connection of menstruation with the teeth, a subject not mentioned in the textbooks, although the connection of pregnancy with the teeth is well known. From a collection of cases of abnormities of menstruation gleaned from literature, Anoufrieff found that during the periods there may be neuralgia, swelling of the gums, bleeding from the gums, and sensitiveness of the dentin. Dentists are aware of the fact that hemorrhages may occur after the extraction of teeth when the operation is performed shortly before or during menstruation, while the same women undergo extractions without any evil consequences between menstrual periods. The author, therefore, urges that dentists should not extract teeth during menstruation, and should even refrain from filling with gold or doing any other painful or exhausting work on the teeth during the periods.

[*Nordisk Tandläkare Tidskrift*, Stockholm, January 1905.]

A CASE OF BRIDGE WORK FOR A THREE-YEAR-OLD BOY. By Dr. Fred Samuel.

The author describes the case of a boy who accidentally lost the four upper deciduous teeth.

Discussing the advisability of substituting the loss of the deciduous organs by means of crown and bridge work, the author gives his reasons in favor of the procedure, as follows:

The absence of the front teeth in a child interferes with speech, depriving the child of the physiological faculty of imitating sounds, which, without doubt, would have a detrimental effect on its intellectual development. This alone would seem to be, in the author's opinion, sufficient reason to substitute lost teeth in children by means of crowns, bridges, or other suitable appliances. Furthermore, the whole front part of the jaw would gradually shrink, rendering quite impossible the eruption of the permanent teeth in a normal arch.

The case in question was treated by the insertion of a bridge supported by two gold shell crowns adjusted to the canines.

PERISCOPE.

Retarded Eruption of the Third Molar.—About six months ago I extracted the upper left first and second molars for a male patient fifty-seven years of age, and now a tooth, probably the third molar, has erupted.—W. J. HEMPHILL, *Dental Review.*

Extending the Plate Over the Canine Region.—All plates can, and should be worn higher over the canine teeth, and the gum made fuller than elsewhere, if one desires to restore the usual depression arising from the extraction of the canines.—L. P. HASKELL, *Pennsylvania Dental Times.*

The Gingival Margin.—Care for it, even if it is hypertrophied to an enormous extent. Remove the irritation that has caused it and you will be surprised at the rapidity with which it will be absorbed. If the natural gingival ring is removed it will not be reproduced, and great recession is usually the result.—*Western Dental Journal.*

Reducing the Melting-Point of Lead.—Pure lead cannot be poured upon a Babbitt metal die. The melting-point must be reduced by addition of one-sixth tin. This must not be poured hot as it comes from the heater, but stirred until it begins to attach to the sides of the ladle.—L. P. HASKELL, *Pennsylvania Dental Times.*

Coal-Gas Poisoning.—Hydrogen dioxid is a most useful remedy in carbonic acid poisoning from inhalation of coal gas, says *Merck's Archives.* It is administered by the mouth and per rectum. By the mouth it is given in doses of 1 ounce diluted with an equal volume of water. By the rectum it is given in full strength in 5-ounce doses.—*Medical Standard.*

Caries.—This journal wishes to announce as an item of news that the word "caries" is a substantive having a plural form but singular meaning. We once knew a little boy who used the word "cheese" in the same way that a number of writers—dental teachers by the way—make use of "caries." It is as incorrect to say caries *are* as it is to say cheese *are.*—*Literary Dentist.*

Antiphlogistic Action of Ichthyol.—Ichthyol is a most valuable substance to reduce inflammatory swelling, and in septic conditions affecting the skin. Its disagreeable odor is very distressing to many patients, but it can be concealed by the addition of oil of citronella, minims xx, to the ounce of ointment. Oil of roses also does well, but is very expensive.—*International Journal of Surgery.*

Swaging Gold or Platinum Plates.—In swaging a gold or a platinum plate, do not hesitate to slit the front and lap, because it facilitates swaging, and there is no possible objection to it. On the other hand, it is a real advantage, because many a gold plate has broken through this, the weakest part of the plate, so that by cutting, lapping, and soldering, it is strengthened one hundred per cent.—L. P. HASKELL, *Pennsylvania Dental Times.*

Treatment of Sensitiveness at the Apex.—To overcome sensitiveness so often found at the ends of root-canals the pulps of which have been devitalized, pump the canals full of eucalyptol and proceed cautiously to the ends. I have often found this treatment effective in cases of sensitiveness following extirpation under pressure anesthesia. It is, however, more effective in cleansing roots after arsenical applications.—R. E. SPARKS, *Dental Review.*

Sterilizing Water.—A method of sterilizing drinking water proposed by MM. Freyssinge and Roche (*Bulletin des Sciences Pharm.*) is by the use of calcium peroxid or calcite. For sterilizing a liter of water 30-50 cgm. of calcium peroxid is added and allowed to remain in contact with the water for two or three hours; the water is then filtered through manganese binoxid, when the whole of the hydrogen peroxid will be removed. The calcium peroxid treatment is more efficacious than if hydrogen dioxid is added, as in the former case the peroxid is given off in the nascent state. Water can be kept sterile for a long time if some calcium peroxid is left in it, taking care to filter through manganese dioxid when required for use.—*Chemist and Druggist.*

Eucain Lactate.—Eucain lactate appears in the form of a white powder, with a melting-point of 155 degrees C. It is easily soluble in water, forming a solution of faint alkaline reaction; 119 gm. of eucain lactate contains the same amount of eucain base as 100 gm. of eucain hydrochlorid. It is said to be very effective as a local anesthetic, and is preferred in eye, ear, nose, and throat operations, being prepared in solutions of different strengths according to the site of operation. —*New York Medical Journal.*

Method of Obtaining Chemically Pure Gold.—To obtain pure gold from gold coin, we weigh the coin, and adding three times this weight of silver, melt the mixed metals in a well-boraxed crucible, pouring the alloy when formed in a fine stream into water, thus granulating it. We place these granulations in a glass flask, after having ascertained their weight. We add to the flask one and a half times as much pure nitric acid by weight as the weight of the granulated silver and gold alloy. The nitric acid must be absolutely free from chlorin. The flask is placed on a sand bath, and heated gently. Provision must be made for the escape of the red, suffocating fumes that arise.

The silver dissolves, and may subsequently be recovered from the nitric acid. The gold is left as a brownish-black, spongy mass. When fumes cease to arise, and the liquid in the flask becomes clear, decant the acid, saving it for the removal of the silver. Now add a fresh charge of nitric acid to the gold and heat to boiling, and continue this digestion of the gold in nitric acid as long as fumes arise, decanting the acid and replacing it with fresh acid from time to time. Then wash the gold several times by decantation with distilled water. Then, collecting the gold upon a filter paper, add potassium carbonate, and folding all in the filter paper, place in a boraxed crucible, melt and pour into an oiled ingot mold. This process of refining will yield gold of a high degree of purity, even as pure as 0.998 fineness. Sulfuric acid may be employed in place of nitric acid where less than ten per cent. of copper is alloyed with gold, but for purifying gold from coinage the use of nitric acid would be preferable.

If for any purpose a greater degree of purity of gold be required than this refined gold, we would dissolve refined gold in aqua regia; dilute this solution well with distilled water, and add solution of oxalic acid, obtaining gold in its chemically pure form.—H. H. Boom, *Stomatologist.*

An Appliance for Retaining Loose Teeth.—The appliance consists of what may be styled two yokes held together by means of bolts or screws. These yokes fit accurately the cervical border of the labial and lingual surfaces of the loose teeth and those intended as supports at either end, and are held in place by the bolts which pass through the interproximal spaces. The method of procedure for making such an appliance is as follows: An accurate impression is obtained of the labial and lingual surfaces of the teeth involved from which a metal die is made. On this die is swaged or burnished a narrow strip of pure gold, thirty gage. This strip is then cut to shape and tried in the mouth and burnished so as to fit the cervical border of the teeth accurately. The yokes should now be strengthened with 22-karat solder. Drill holes the exact gage of the bolts through the labial yoke at the approximal spaces. Place the yokes in position and with a sharp instrument mark on the lingual yoke where the corresponding holes are to be drilled. The bolts are made of platinum and iridium wire, with cone-shaped head and nuts, which are to be countersunk in the yokes. Where it is necessary to hold an elongating tooth or to prevent the yokes slipping on the roots, a half cap may be swaged to fit the lingual surface of the tooth and soldered to the lingual yoke. This cap is cemented to the tooth, the yokes bolted firmly in place, and the heads and nuts ground and polished smooth. This appliance may be used in every case where the interproximal space is sufficiently wide to permit the passage of a bolt.

The small nut furnished with the Bryant crown and bridge repair system will be found very useful in connection with this method.—E. Darwin Reed, *Dental Brief.*

Physical Education.—The importance of the culture of physical development as a factor in the promotion of national welfare is not a new discovery. Individual voices have proclaimed it many a time and oft, but they have not been able to attach many followers to their attempted crusade. Even the highest educational authorities have lent their official countenance to the doctrine, and have promoted the practice of something like systematic physical drill in elementary schools. Yet it must be admitted that the great body of the people remain unconcerned and apathetic. Interest, it is true, abounds in forms of exercise which express themselves in the shape of games and sports, and which can be organized into a public spectacle. But the perception of the value of physical training

as a national interest of the first order is not more lively than is the appreciation of the importance of efficient elementary and secondary education. It is this deadness of public opinion which forms the serious obstacle to progress in each of the two directions just indicated. All the stir, agitation, and bustle leave, it is to be feared, the public conscience untouched. Failure to recognize the significance of all this has been responsible for the collapse of more than one promising plan, and it is to be hoped that the active promoters of the latest scheme will not fall into a similar error. The hope for an improvement in the physical well-being of the nation lies much less in elaborate schemes and eloquent speeches than in the prosecution of sound methods in the schoolroom and the playground, and in the cultivation of a public policy which will secure healthy homes and surroundings for the toiling millions of our great cities. When these ends are attained, healthy forms of exercise will follow as a matter of course.—*Monthly Cyclopedia of Practical Medicine.*

Report on the Use of Stovain.—My observations have led me to the following conclusions:

1. That stovain as a local anesthetic is apparently equal to cocain.

2. That the time necessary for acquiring local anesthesia is the same as that of cocain.

3. That it apparently does not contract the nasal mucous membrane to so great an extent as do similar solutions of cocain. This is at times a disadvantage when the nasal passages are desired to be widely opened for more thorough inspection of the cavities; on the other hand, it is ofttimes an advantage, as in snaring of redundant tissue by not too greatly shrinking it, and therefore making it more easy to be removed.

4. Stovain does not produce nearly so great a sense of constriction in the pharynx as that which is produced by cocain. In this respect it has a decided advantage over cocain, especially in those patients to whom the symptoms of constriction with constant desire to hawk and remove a supposed foreign body are very distressing.

5. Solutions of stovain have a peculiar odor of stale fish, which has been annoying to some of the patients.

6. Some of the patients have complained that solutions of stovain are more bitter than similar solutions of cocain.

7. We have seen no toxic effects following the use of stovain; there have been no secondary headaches or feeling of lassitude after the local anesthetic effect of the drug has disappeared; I am also of the opinion that the secondary swelling of the mucous membrane following the use of stovain is less than that which occurs after cocainization.

It is but fair to say that during this period when cocain was employed we had no case of marked cocainism.—C. G. Coakley, *Medical News.*

Treatment of Pyorrhea Alveolaris.—The removal of serumal deposits from the roots of teeth must be thorough, as upon this operation in treatment will hinge success or failure in result. After removal of deposits, brush and cleanse teeth as perfectly as possible with dilute sulfuric acid and pulverized pumice-stone. After use of brush, use sticks of soft pine or orange-wood shaped to suit, to reach if possible all exposed surfaces of crown and root structure. Strength of acid solution varies from one of acid to eight, ten, fifteen, or twenty of water, according to age of patient and condition of soft tissues and alveolar process. The acid may be applied fearlessly, as no evil results will follow its application, at least such has been my experience in the free use of it in treatment of this disease for nearly fifty years. After application of acid and pumice, force water with bulb syringe between and around the necks of teeth and into the pockets, for the effective removal of the pumice powder and any attached fragments of deposit, and have patient rinse mouth thoroughly with water until freed of all foreign substance, after which instruct in the use of finger pressure on the gums and the use of brush with plenty of water. This is a very important requisite in the care of the teeth, and for the preservation of healthy gums, and should be freely indulged; also washing of the surface of the tongue as a life practice for prevention of germ development and for freedom from fetid breath. Then apply to the gums freely campho-phenique, or a saturated solution of spirits of turpentine and gum camphor, and request patient to use brush with plenty of water in mouth regularly after meals, and to apply finger pressure on gums several times daily until they are healthy and firm and fit closely to the teeth. I advise that not a single brushing must be omitted until the cure is complete, as it is more important and reliable than all the medicinal nostrums now in use. The second or third days after the removal of deposits make a careful inspection to determine if the removal was thorough, then re-apply campho-phenique or turpentine, also at the following sitting five or six days later, and dismiss with repetition of instructions regarding brush,

water, and finger pressure. If instructions are followed there will be no return of the disease, and a healthy mouth in most cases be the inevitable result.—B. F. Arrington, *Dental Brief.*

Oil Stones.—The Arkansas, Turkish and Washita stones are essentially oil stones. While water may be and is often used as a lubricant, the hone is kept in better condition and better results obtained when oil is used for lubricating. An imported water hone manufactured in Austria and known as the Franz Swatey stone is exceptionally good for the finest edges of knives, lancets, etc. If but one hone is to be used the medium grade will prove the most practical. The hard and medium qualities will have their daily demand. Oil stones improve with age if kept clean and well lubricated, and deteriorate if neglected and allowed to dry out for any length of time. A good grade of oil stone will take up oil until fully saturated, when it is in its best condition. If not cleaned after use the oil becomes thickened, forming a coating on the surface, holding particles of steel which become imbedded in the stone, and any attempt to hone on a stone in such condition will result in more of a burnish to the edge than a free cut, and skilful honing cannot be done on a dry and dirty hone. If not in daily use the stone should be left clean or simply moistened in oil. A thorough soaking or cleansing of oil stones is occasionally necessary. Kerosene oil is often used and recomended, and while it cleans well, in time it hardens a stone and changes its quality. A saturated solution of caustic potash in water is preferable. Care in its use is necessary, from its caustic action and poisonous nature. As a lubricant sperm oil is considered the best for edges. Resurfacing a stone is necessary whenever any concavity of the surface or other defacement is observable. A coarse grade of emery or sandpaper secured on a flat surface, the stone used as a plane, reproduces the surface, using the finest grades of emery or sandpaper for the finishing. The stone should be clean and free from oil previous to resurfacing, and in use, securely fastened, in good light, and convenient to the chair.—B. Bannester, *Dental Summary.*

HINTS, QUERIES, AND COMMENTS.

INLAY ANCHORAGE BY MEANS OF STAPLE.

After making a large inlay of high-fusing porcelain for a devitalized tooth, additional anchorage can be secured by grinding a groove quite deep in the baso-pulpal side (Fig. 1), fitting in a staple of No. 21 or 22 platino-iridium wire (Fig. 2) in the proper direction, and fastening this staple into the inlay with a low-fusing body (Fig. 3). This can be done after the matrix is taken off, and the inlay found correct. Do not let the staple come too far toward the cutting edge, and be sure to have the ends point toward the apex of the tooth.

Another method, as given in the May Cosmos, is to melt a knob of the prosthetic porcelain on the pulpal side, enlarging the cavity to receive this extra porcelain. Of course the cavity has to be enlarged to receive the staple,

Fig. 1. Fig. 2. Fig. 3.



but this is done after the additions have been made to the inlay.

Care should be exercised that none of the added porcelain approaches the margins, or the fit will be destroyed.

Will S. Payson, D.D.S.

Castine, Me.

OBITUARY.

DR. DAVID LESLEY STINE.

Died, at St. Vincent's Hospital, Indianapolis, Ind., December 7, 1904, of appendicitis, David Lesley Stine, aged thirty-six.

Dr. Stine occupied an enviable position among the members of the profession of Indianapolis. His gentle and quiet manner, his honesty and fairness, his generosity and professional skill, all contributed to his popularity. Upon his graduation from the Indiana Dental College in 1897 he was appointed a demonstrator in the operating department of that institution, a position which he creditably filled until 1901, when he resigned the office owing to his appointment in the State Board of Dental Examiners. In the Board he filled apart from the office of member that of secretary, a position he held up to the time of his death.

Dr. Stine was a member of a number of local social organization; of the Indiana State Dental Association, and of Delta Sigma Delta Fraternity.

In December 1901 he was married to Miss Stella Keyes of Stockton, Cal., who with a child of two years, survives him.

DR. EBEN GROUT CUMMINGS.

Died, at Concord, N. H., December 11, 1904, of interstitial nephritis, Eben Grout Cummings, D.D.S.

Dr. Cummings was born in Acworth, N. H., November 13, 1828. He commenced the study of dentistry under Dr. Keeler of Claremont, N. H., and in 1855 after fulfilling the educational requirement of the Philadelphia College of Dental Surgery was graduated from that institution with the D.D.S. degree. Dr. Cummings was the first dental practitioner of the State of New Hampshire to receive the dental degree. He commenced practice in Lancaster immediately upon graduation, dividing his time between that town and Littleton. Four years afterward he moved to Concord, where he continued in practice up to the time of his death.

Dr. Cummings was the oldest resident dentist in the city of Concord and one of the best known and most successful practitioners of his state. He was active in society work and held at different periods in his career positions of honor and trust in the dental societies of his state. He was also a member of a number of Masonic orders.

He was married in 1855 to Miss Amelia J. Woodbury of Claremont, who died July 3, 1903.

He is survived by two sons, Frederick E. Cummings, M.D., a medical practitioner of Pittsfield, N. H., and Irving O. Cummings, Brewster, Mass.; also by two brothers and three sisters.

DR. ISAAC BRYANT.

Resolutions of Regret.

At a called meeting of the Colorado State Dental Association, held in Denver, February 5, 1905, a committee was appointed to draft and present to the widow of Dr. Isaac Bryant the following resolutions:

Whereas, Our fellow-member, Dr. Isaac Bryant, has been removed from our midst by death, we desire to express our sense of regret upon the great loss the Association has sustained; therefore be it

Resolved, That we offer our sincere sympathy and condolence to his widow and relatives in this their sad bereavement; also be it

Resolved, That a copy of these resolutions be sent to his widow and family, and also be spread upon the minutes of this Association.

Wm. L. Roberts,
J. Allen Smith,
L. K. Fullerton,
Committee.

DR. CLARK LAMOTTE GODDARD.

RESOLUTIONS PASSED BY THE ALAMEDA COUNTY DENTAL SOCIETY.

The members of the Alameda County (Cal.) Dental Society passed the following resolutions of regret upon the loss sustained by the death of Dr. Goddard:

Since Almighty God in His infinite wisdom has thought best to call from our midst one of our most active members and truest friends, and, since we cannot understand all the Creator's ways, let us put aside our wishes and humbly submit to the Divine will with the feeling that so surely as our departed member lived an honest, upright life here, just so surely will he receive his reward hereafter.

Whereas, In the death of Clark LaMotte Goddard, M.A., D.D.S., the Alameda County Dental Society, the community, and the dental profession at large have lost one who has made the world better for his having lived in it; one whom all loved as a man and honored as an exponent of the most advanced and truly scientific dentistry; one ever ready with sympathy or advice; and one whose professional life was and still will be an inspiration to greater efforts and higher achievements in the service of his fellow-men; therefore, be it

RESOLVED, That we, the members of the Alameda County Dental Society, express our heartfelt sympathy and extend our condolence to the bereaved family, with the assurance that we shall ever hold in kindest recollection the memory of our past association with him. Realizing how signally words fail to carry the feelings we wish to put into them, we can but "pray that our Heavenly Father may assuage the anguish of the bereavement and leave only the cherished memory of the loved and lost."

RESOLVED, further, That these resolutions be spread in full upon the minutes of the society and that copies be sent to the bereaved family and to the dental magazines.

WM. F. SCHWANER, *Pres.*
J. S. ENGS, *Vice-Pres.*
H. B. KNOX, *Sec'y.*
H. N. HENDERSON, *Treas.*

CECIL CORWIN,
R. A. SUMMERS,
CHARLES S. AYRES,
Committee.

SOCIETY NOTES AND ANNOUNCEMENTS.

DENTAL SOCIETY MEETINGS: June and July, 1905.

JUNE.

INDIANA STATE DENTAL ASSOCIATION. Indianapolis. Three days: June 27th to 29th.

MASSACHUSETTS DENTAL SOCIETY. Boston. Three days: June 7th to 9th.

MINNESOTA STATE DENTAL ASSOCIATION. Minneapolis. Three days: June 1st to 3d.

NORTH CAROLINA DENTAL SOCIETY. Waynesville. Four days: June 28th to July 1st.

NORTHERN OHIO DENTAL ASSOCIATION. Cleveland. Three days: June 6th to 8th.

PENNSYLVANIA STATE DENTAL SOCIETY. Philadelphia. Three days: June 27th to 29th.

JULY.

AMERICAN MEDICAL ASSOCIATION—SECTION ON STOMATOLOGY. Portland, Oregon. Four days: July 11th to 14th.

INTERSTATE DENTAL FRATERNITY. Buffalo, N. Y. July 24th.

LEWIS AND CLARK DENTAL CONGRESS. Portland, Oregon. Four days: July 17th to 20th.

MICHIGAN DENTAL ASSOCIATION. Detroit Three days: July 10th to 12th.

National Association of Dental Examiners. Buffalo, N. Y. July 24th.

National Association of Dental Faculties. Buffalo, N. Y. July 27th.

National Dental Association. Buffalo, N. Y. Four days: July 25th to 28th.

New Jersey State Dental Society. Asbury Park, N. J. Four days: July 19th to 22d.

Examiners' Meetings.

Connecticut Dental Commissioners. Hartford. June 8th to 10th.

District of Columbia Board of Examiners. Washington. July 5th to 7th.

Iowa Board of Dental Examiners. Iowa City. June 12th and 13th.

Kentucky Board of Dental Examiners. Louisville. June 6th.

Massachusetts Board of Registration. Boston. June 21st to 23d.

Minnesota Board of Dental Examiners. Minneapolis. June 5th to 7th.

New Hampshire Board of Registration in Dentistry. Manchester. June 13th to 15th.

New Jersey Board of Registration. Trenton. July 11th to 13th.

North Carolina Board of Dental Examiners. Waynesville. June 26th to 28th.

North Dakota Board of Dental Examiners. Grand Forks. July 11th to 13th.

Ohio Board of Dental Examiners. Columbus. June 27th to 29th.

Pennsylvania Board of Dental Examiners. Philadelphia and Pittsburg. June 6th to 9th.

Rhode Island Board of Registration. Providence. June 27th to 29th.

South Carolina Board of Dental Examiners. White Stone Springs. July 14th.

South Dakota Board of Dental Examiners. Mitchell. July 11th.

Vermont Board of Dental Examiners. Montpelier. July 5th to 7th.

Virginia Board of Dental Examiners. Richmond. June 13th.

West Virginia Board of Dental Examiners. Morgantown. June 7th to 9th.

Wisconsin Board of Dental Examiners. Milwaukee. June 26th.

"F. D. I."

INTERNATIONAL DENTAL FEDERATION.

The next annual meeting of the Executive Council of the Fédération Dentaire Internationale will convene in Hanover, Germany, August 7, 1905, immediately following the annual meeting of the Central-Verein Deutscher Zahnärzte. Announcement of the program for the meeting and the projected work for the Federation during the present period will shortly be made through the dental journals and through the official bulletin of the Federation.

Edward C. Kirk, *Secretary-general.*

INTERSTATE DENTAL FRATERNITY.

The board of governors of the Interstate Dental Fraternity will convene for the annual business meeting of the order, in Buffalo, Monday, July 24, 1905. The annual banquet will occur during the week, and due notice thereof will be sent to the members as soon as arrangements can be made, and the exact date fixed. It is hoped that the fraternity will meet in large numbers on this occasion.

R. M. Sanger, *National Sec'y,*
East Orange, N. J.

NATIONAL DENTAL ASSOCIATION.

The ninth annual session of the National Dental Association will be held in Buffalo, N. Y., July 25 to 28, 1905, inclusive.

The Hotel Iroquois has been selected by the local committee of arrangements as headquarters, where all general sessions of the Association and of the sections will be held. The clinics will be held at the rooms of the Dental Department, University of Buffalo.

Rates at the Hotel Iroquois are, single room per day $1.50, $2.00, and $2.50; rooms for two persons, $3.00 and $4.00; single rooms with bath $3.00 and $3.50; rooms with bath for two persons $5.00, $6.00, $7.00, and $7.50; all rooms on the European plan.

The usual railroad rate of one and one-third fare for the round trip, certificate plan, has been arranged for by the Executive Committee.

All pay full fare going, taking the proper certificate therefor from the ticket agent, which when properly certified at the meeting, entitles the holder to return for one-third the regular rate.

Tickets going may be purchased from July 20th to 26th, and are good returning until and including August 2d.

Both the general officers and those of the sections have been working hard to provide an interesting and instructive program, and a large attendance is expected.

A. H. Peck, *Rec. Sec'y*,
92 State st., Chicago, Ill.

NATIONAL DENTAL ASSOCIATION.

Clinic Section.

The National Dental Association will meet at Buffalo, N. Y., commencing July 25th. It is the desire of the president and chairman of the Clinic Section to hold the best clinic in the history of the society. The clinics will be held Wednesday and Thursday, July 26th and 27th, in the Buffalo Dental College, where there is every facility for making practical operations, as well as ample room for all those wishing to give table clinics. There is room for holding three hundred table clinics.

The work of the Clinic Section is progressing most favorably. Everything at present indicates that the operative clinic will be the largest that the National Dental Association has ever held. There will be forty operators for both mornings upon which the clinics will be held. The territory from Maine to Utah and from Minnesota to Texas has been very fully covered, and men from almost all of the states in the section named have signified their willingness to be present and operate. The majority of the men of The G. V. Black Dental Club will be present, and will operate upon both days. Such well-known Northwestern men as Drs. Searl, Lewis, Clack, Conzett, Beemer, G. D. Moyer, W. H. K. Moyer, W. D. James, F. S. James, Gallagher, Carlson, Fawcett, etc., will once more operate in a body, as was done at the International Dental Congress.

Dr. T. W. Brophy of Chicago has kindly consented to assist, and will make a surgical operation. Those interested are certain of seeing something which they will not soon forget. Dr. M. C. Smith of Lynn, Mass., will also make a surgical operation.

Somnoform and narcotile will be fully demonstrated.

A large number of gentlemen will give table clinics.

At the present writing I feel confident in saying that the best men in the profession will operate at Buffalo on July 26th and 27th. A full report has not been received from all the men on the committee, but sufficient data are before me upon which to base the opinion above expressed.

The program will appear in the July Cosmos.

Those interested can apply for further information to any one of the following:

Dr. S. W. Bowles, 1315 New York ave., Washington, D. C., chairman for District of Columbia, Delaware, and New Jersey.

Dr. E. C. Blaisdell, 1 Pleasant street, Portsmouth, N. H., chairman for Maine, New Hampshire, and Vermont.

Dr. F. W. Gethro, 31 Washington street, Chicago, chairman for Illinois and Wisconsin.

Dr. L. L. Barber, Spitzer building, Toledo, Ohio, chairman for Ohio and Indiana.

Dr. S. Eschelman, 421 Franklin street, Buffalo, N. Y., or Dr. R. Murray, 715 Elmwood avenue, Buffalo, N. Y., chairmen for New York and Ontario, Canada.

Dr. M. F. Finley, 1928 1st street, Washington, D. C., chairman for District of Columbia, Virginia, and West Virginia.

Dr. T. P. Hinman, 22 S. Broad street, Atlanta, Ga., chairman for Georgia, North Carolina, South Carolina, Florida, Alabama, Mississippi, Tennessee, Louisiana, and Texas.

Dr. H. B. McFadden, 3505 Hamilton street, Philadelphia, Pa., chairman for Pennsylvania.

Dr. G. E. Savage, 518 Main street, Worcester, Mass., chairman for Massachusetts, Connecticut, and Rhode Island.

Dr. S. H. Voyles, 3201 Washington avenue, St. Louis, Mo., chairman for Missouri, Arkansas, Kansas, and Nebraska.

Those having new instruments, appliances, etc., are cordially invited to display them. Communicate with your state chairman or with

E. K. Wedelstaedt, *Sec'y Clinic Section*,
204 N. Y. Life Bldg., St. Paul, Minn.

NATIONAL DENTAL ASSOCIATION.

Section I.

The following program will be offered for the consideration of this section in Buffalo, July 25 to 27, 1905: Dr. Calvin S. Case, Chicago, "Orthodontia." Dr. C. Edmund Kells, New Orleans, La., "Orthodontia." Dr. V. H. Jackson, New York, "Orthodontia." Dr. R. Ottolengui, New York, "Orthodontia." Dr. H. H. Johnson, Macon, Ga., "Prosthetic Dentistry." Frederic Freeman, Boston, "Prosthetic Dentistry." Dr. W. Storer How, Philadelphia, "Some Phases of Crown and Bridge Work."

A special paper entitled "The D.D.S. Abroad," will be read by Dr. R. H. Hofheinz, Rochester, N. Y.

Dr. Thomas P. Hinman, *Chairman*,
Atlanta, Ga.,
Dr. J. G. Fife, *Sec'y*,
Dallas, Tex.

Section II.

The following program will be offered for the consideration of this section in Buffalo, July 25 to 27, 1905:

J. V. Conzett, Dubuque, Ia., "Gold as a Filling Material." B. L. Thorpe, St. Louis, Mo., lantern lecture, "Pioneer Manipulators of Gold Foil." Chas. Milton Ford, New York city, "Dental Education." W. R. Clack, Clear Lake, Ia., "The Necessity for and Method of Preserving the Integrity of the Interproximal Space." Dr. D. O. M. LeCron, St. Louis, Mo., "A Few Experiments in Porcelain." Dr. D. W. Fellows, Portland, Me., "A Century of Standard Dental Writings." Dr. B. Holly Smith, Baltimore, Md., "Operative Dentistry." Prof. Geo. B. Snow, Buffalo, N. Y. (Subject to be announced). Dr. W. H. K. Moyer, Little Falls, Minn. (Subject to be announced). Dr. D. R. Stubblefield, Nashville, Tenn., "Nomenclature." Dr. S. H. Guilford, Philadelphia, "The Nomenclature of Orthodontia."

Howard E. Roberts, *Chairman*,
Phila., Pa.,
C. S. Butler, *Sec'y*,
Buffalo. N. Y.

Section III.

In preparation for the meeting of the National Dental Association at Buffalo, N. Y., July 25 to 27, 1905, original papers and investigations are asked to be submitted upon the following topics: Oral surgery, anatomy, physiology, histology, pathology, etiology, hygiene, prophylaxis, materia medica, and allied subjects.

J. D. Patterson, *Ch'man Sect. III.*,
Kansas City, Mo.

AMERICAN MEDICAL ASSOCIATION—SECTION ON STOMATOLOGY.

The next meeting of the American Medical Association will be held in Portland, Oregon, July 11 to 14, 1905. The program for the Section on Stomatology is as follows:

1. Chairman's Address. Vida A. Latham, Chicago.
2. "The Causes and the Treatment of the Mouth-Manifestations of Certain Metabolic Disorders." Alfred C. Croftan, Chicago.
3. "The Oral Manifestations of Diabetes Mellitus." Hermann Prinz, St. Louis, Mo.
4. "The Urine and Saliva in So-called Pyorrhea Alveolaris." Wm. J. Lederer, New York city.
5. "Further Researches in the Treatment of Interstitial Gingivitis." Eugene S. Talbot, Chicago.
6. "Excretion of Toxic Products into the Mouth, with Relation to Local Infection." Fenton S. Turck, Chicago.
7. "The Relations of Dentistry to General Medicine." Samuel Hopkins, Boston, Mass.
8. "A Common Ground for Medicine and Dentistry." Frank L. Platt, San Francisco.
9. "The Physician as a Dentist." Calvin W. Knowles, San Francisco.
10. "The Physician's Duty to the Child, from a Dental Standpoint." Alice M. Steeves, Boston, Mass.
11. "Dentistry of Tomorrow." H. P. Carlton, San Francisco.
12. "What Will Probably be the Dental Educational Standard for the Coming Decade?" C. C. Chittenden, Madison, Wis.
13. "Fatal Oral Pathologic Conditions." G. V. I. Brown, Milwaukee, Wis.
14. "Surgical Bacteriology of the Mouth." A. H. Levings, Milwaukee, Wis.
15. "Surgical Aspects of Disturbed Dentition of the Third Molar." M. L. Rhein, New York city.

16. "The Treatment of Suppurative Affections of the Face and Neck Emanating from the Mouth." M. I. Schamberg, Philadelphia.

17. "The Medical Relations of Certain Conditions of the Mouth." L. Duncan Bulkley, New York city.

18. "Some Effects of Inebriety on the Teeth and Jaws." T. D. Crothers, Hartford, Conn.

19. "The Ossification of the Lower Jaw." Edward Fawcett, Bristol, Eng.

20. "Ankylostomiasis and Tongue Pigment." T. M. Russell Leonard, Grenada, B. W. I.

21. "Notes on Tooth-Genesis in Man." H. W. Marett Tims, London, England.

22. "The Etiology of Tooth-Corrugations." G. Lenox Curtis, New York city.

23. "To What Extent are Teeth Necessary to the Human Being?" M. H. Fletcher, Cincinnati, Ohio.

24. "Anesthesia by Ethyl Chlorid and Similar Agents." H. C. Miller, Portland, Oregon.

25. "The Roentgen Rays in Dentistry." M. Kassabian, Philadelphia.

The program is entirely scientific. All dentists are invited to be present and take part in the discussions. Those wishing to become members may do so by filling out blanks furnished by the Association, signed by the president and secretary of a state or local dental or medical society. Inclose five dollars, and send to the secretary of the Section on Stomatology for his signature. This also includes the *Journal of the American Medical Association* for one year.

VIDA A. LATHAM, *Chairman.*
EUGENE S. TALBOT, *Sec'y,*
103 State st., Chicago, Ill.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

THE annual meeting of the National Association of Dental Examiners will be held at the Iroquois Hotel, Buffalo, N. Y., beginning Monday at 10 A.M., July 24, 1905, and continuing until adjournment. The rates per day for single rooms will be $1.50, $2, and $2.50, $3 and $4 for double, and $3 and $3.50 for rooms with bath. The sessions will be held in commodious rooms in the hotel. Write early and secure your accommodations. Arrangements have already been made for members from the East for reduced excursion rates on the fast trains of the Delaware and Lackawanna Railroad, leaving New York 10 A.M., 6.10 P.M., 8.45 P.M., and 2 A.M. It is earnestly requested that the secretaries of the boards will communicate at once any changes in members' names and addresses.

CHAS. A. MEEKER, *Sec'y,*
29 Fulton st., Newark, N. J.

"LEWIS AND CLARK" DENTAL CONGRESS.

THE Lewis and Clark Dental Congress to be held in Portland, Oregon, July 17, 18, 19, and 20, 1905, from the indications up to the present time, and the class of men who are to take part in the program, which is already largely formed, is sure to be a meeting of unusual size and interest, and it is believed that it will closely approach the International Dental Congress held in St. Louis last year.

The various committees have been working energetically each in its different line, and the local committee of arrangements has secured the Armory of the Oregon National Guard as a meeting place for the congress. In this building will be held the meetings of the American Medical Association, which holds its annual session in Portland the week preceding that of the Lewis and Clark Dental Congress. The building will be fitted up with every accommodation for clinics, exhibits, and essays, namely, electric wiring, gas, water, tables for demonstrators, chairs, electric engines, and other conveniences. The exhibit and clinic hall in this building will have an area of 20,000 square feet. The hall for business meetings and the reading of essays and discussions will seat between 1,000 and 1,500 people; is well lighted and conveniently arranged for the use of a lantern in illustrating papers.

The committee on essays has secured a large number of valuable and original papers, some of which will be given by men of international reputation. This part of the program will be highly instructive and interesting.

The committee on clinics has secured from all parts of the United States, clinics by seventy-five operators, and there is no question that by the time of the opening of the congress the number of clinics will be increased to 150 or 200.

The committee on exhibits has secured the co-operation of the leading manufacturers of dental goods in the United States, most of whom have definitely signed contracts to exhibit at the congress. The manufacturers will have, in addition to their exhibits, demonstrators of repute to exploit their various new appliances and methods of practice.

The membership is limited to no locality, and is open to dentists throughout the world. Membership fee, $5.00.

Memberships in the congress are being taken rapidly, especially in the territory west of the Rocky Mountains; while interest in the congress among men of Eastern states is by no means small. It is confidently believed that there will be in attendance a membership of at least 1,000. All who join the congress and pay the membership fee will be entitled to a bound copy of the Proceedings, which will be mailed to them free of cost.

The program so far as arranged includes the following:

Essayists.

Burton Lee Thorpe, St. Louis, Mo.; Julio Endelman, Philadelphia, Pa.; J. C. Hennessy, Reno, Nev.; Ray D. Robinson, Los Angeles, Cal.; William Bebb, Los Angeles, Cal.; H. J. Judurz, New York city, N. Y.; M. L. Rhein, New York city, N. Y.; C. V. Vignes, New Orleans, La.; John S. Marshall, U. S. A., Presidio, Cal.; C. N. Thompson, Chicago, Ill.; Eugene S. Talbot, Chicago, Ill.; Crittenden Van Wyck, Oakland, Cal.; Clyde Payne, San Francisco, Cal.; G. V. I. Brown, Milwaukee, Wis.; C. N. Johnson, Chicago, Ill.; B. S. Scott, Tacoma, Wash.; J. M. Meyer, Tacoma, Wash.

Clinicians.

C. N. Johnson, Chicago, Ill.; Crittenden Van Wyck, San Francisco, Cal.; C. N. Thompson, Chicago, Ill.; G. W. Schwartz, Chicago, Ill.; C. L. Rose, Fargo, N. D.; C. H. Merritt, Oakland, Cal.; A. M. McGee, Louisiana, Mo.; W. V-B. Ames, Chicago, Ill.; M. L. Rhein, New York city; Lelan O. Green, Chicago, Ill.; Porcelain Club (7 in number), Los Angeles, Cal.; Portland Porcelain Club (6 in number), Portland, Ore.; J. L. Pease, Oakland, Cal.; G. A. Rawlings, Bismarck, N. D.; John S. Marshall, U. S. A., Presidio, Cal.; J. J. McLaughlin, North Adams, Mass.; E. R. Tait, Oakland, Cal.; J. W. Neblett, Presidio, Cal.; G. E. Longeway, Great Falls, Mont.; E. B. Edgars, Seattle, Wash.; H. C. Miller, Portland, Ore.; L. P. Haskell, Chicago, Ill.; F. W. Hergert, Seattle, Wash.; O. J. Smith, St. Louis, Mo.; C. A. Soutnwell, Boisé, Idaho; G. N. Wasser, Cleveland, Ohio; R. B. Gentle, New York city; V. H. Frederick, St. Louis, Mo.; Russel Hill, Hamilton, Mo.; W. F. Lawrenz, St. Louis, Mo.; E. W. Dodez, Ft. Wayne, Ind.; G. V. I. Brown, Milwaukee, Wis.; P. H. Wuilleman, San Francisco, Cal.; E. B. Reynolds, Seattle, Wash.; J. S. Engs, Oakland, Cal.; A. J. Holmes, New Westminster, B. C.; J. S. Baldridge, Sedro Woolley, Wash.; Alice M. Steeves, Boston, Mass.; H. J. Smith, Genesee, Idaho; H. W. Bates, Denver. Colo.; R. D. Robinson, Los Angeles, Cal.; F. L. Platt, San Francisco, Cal.; W. J. Hacking, New Westminster, B. C.; G. A. Louque, New Orleans, La.; M. E. Grossman, Honolulu, H. I.; William Finn, Cedar Rapids, Ia.; T. K. Ledyard, San José, Cal.

Partial List of Exhibitors.

S. S. White Dental Mfg. Co., Ritter Dental Mfg. Co., Gideon Sibley, Klewe & Co., J. W. Edwards, Co., W. V-B. Ames, J. W. Ivory, Detroit Dental Mfg. Co., Dr. X. Dodel, Edw. Rowan, Keasby & Mattison Co., Heisy Dental Specialty Co., The American Cabinet Co., Ransom & Randolph Co., Lambert Pharmacal Co., Armour & Co., Kress & Owen Co., E. DeTrey & Son, Harvard Dental Mfg. Co., A. C. Clark & Co., J. M. Ney & Co., Dentists' Supply Co., Electro-Dental Mfg. Co., Cleveland Dental Mfg. Co., Horlick's Malted Milk Co., Oakland Chemical Co., J. T. Milliken Co., Hall & Ruckel, Victor Mfg. Co., Boston Pharmacal Co., Velvo Dental Specialty Co.

Railroad and Hotel Rates.

Railroad rates will be low—$56.00 round trip from Chicago, $45.00 from the Missouri River, and less than one-half regular fare from points east of Chicago. Round-trip tickets are good for ninety days and allow choice of routes.

Hotel rates range from $2.50 to $7.00 per day. Following is a partial list of hotels: Hotel Portland (European plan), Hotel Imperial (European), Hotel Perkins; Private hotels, viz, The Eaton (European), The Norton (American), Elton Court (European and American), Hobart-Curtis (American). The

Exposition Accommodation Bureau, Goodnough Bldg., 5th and Yamhill Sts., will secure rooms in private families near the Armory, at a rate of $1.25 per day for single, or $2.50 per day for double rooms.

GENERAL COMMITTEE.

NORRIS R. COX, D.D.S., *Chairman*, Abington Bldg., Portland, Oregon.

ARTHUR W. CHANCE, D.D.S., M.D., *Secretary*, 809-810 Dekum Bldg., Portland, Oregon.

The following associations are in affiliation:

OREGON.—State Dental Association. Stomatological Club.

CALIFORNIA.—State Dental Association. Southern California Dental Association. San Francisco Dental Association. Alameda County Dental Society.

BRITISH COLUMBIA. — British Columbia Dental Association.

WASHINGTON.—State Dental Association. Seattle Dental Club. Tacoma Dental Club. Spokane Dental Club.

IDAHO.—State Dental Association.

MONTANA.—State Dental Association.

UTAH.—State Dental Association.

NEVADA.—

COMMITTEES.

Executive Committee. — Norris R. Cox, Portland, Chairman; C. S. Irwin, Vancouver, Wash.; Arthur W. Chance, Portland, Secretary; Jean Cline, Portland; E. G. Clark, Portland.

Committee on Essays.—S. J. Barber, Portland, Chairman; C. L. Goddard, San Francisco; B. F. Eschelman, Tacoma.

Committee on Clinics.—G. H. Nottage, Portland, Chairman; J. M. Meyer, Tacoma, Wash.; C. E. Post, San Francisco; A. Stark Oliver, Spokane, Wash.; Claude W. Gates, Salt Lake, Utah; J. H. Holmes, New Westminster, B. C.; A. W. Cate, Boisé, Idaho; W. H. Barth, Great Falls, Mont.; F. I. Shaw, Seattle, Wash.

Committee on Exhibits and Manufacturing Clinics.—W. F. Lewis, Portland, Chairman; Woodard, Clarke & Co., Portland; Archer & Schanz Co., Portland; John Welch Dental Depot, Portland; Oregon Dental Supply Co., Portland.

The Committee on Clinics asks for voluntary clinics or table demonstrations from members of the profession, and suggests that notice of the same be sent the committee as soon as possible. In order that the program be complete, names of clinicians and clinics must reach the chairman of Clinic Committee not later than June 15th.

Visitors will have an opportunity to see the Lewis and Clark Exposition—the largest held in the United States for the past thirty years, excepting Chicago, 1893, and St. Louis, 1904. $30,000,000 are being expended on this exposition.

PACIFIC NORTHWEST ALUMNI ASSOCIATION OF THE UNIVERSITY OF PENNSYLVANIA.

THE annual reunion of the Pacific Northwest Alumni Association of the University of Pennsylvania will be held at the University Club, Portland, Oregon, Saturday evening, July 15, 1905.

All members of the association are most earnestly requested to be present, and all visiting University of Pennsylvania graduates who expect to be in Portland at that time are cordially invited to meet with us.

CHARLES E. MCCLURE, *Sec'y.*

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

THE annual meeting of the National Association of Dental Faculties will be held in Buffalo, N. Y., commencing at 2 P.M. Thursday, July 27, 1905. The Executive Committee will meet at 10 A.M. on the same day.

Special business to come before the N. A. D. F. is the consideration of the proposed revision of the constitution and by-laws.

H. B. TILESTON, *Chairman Ex. Com.*,
JOHN I. HART, *Sec'y Ex. Com.*,
New York, N. Y.

NORTHERN OHIO DENTAL ASSOCIATION.

THE forty-sixth annual meeting of the Northern Ohio Dental Association will be held June 6, 7, and 8, 1905, at Gray's Armory, Cleveland, Ohio.

This is not only one of the oldest, but one of the best attended meetings in the country. This year the program is one of unusual strength and interest. The leading subjects for consideration are — (1) Humanitarian Methods. (2) Mistakes. (3) Prophylaxis.

Under the first is considered "High-Pressure Anesthesia," by Dr. C. G. Myers, Cleveland, and "High-Pressure Anesthesia as Compared with Other Pain-Preventing Methods," by Dr. D. H. Zeigler, Cleveland. Essays under the second group include the "Mistakes of the Country Dentists," by Dr. R. D. Wallace, Scio, Ohio; "Mistakes of the City Dentists," by Dr. F. J. Spargur, Cleveland, Ohio, and "Mistakes in Ethics," by Prof. S. H. Guilford, Philadelphia, Pa. The third includes the essays—"The Sources of Tooth-Life, and Their Relative Importance," by Dr. D. D. Smith, Philadelphia, Pa., and "Diseases of the Peridental Membrane and Treatment," by Dr. J. V. Stahl, Wooster, Ohio.

Throughout the entire program much attention will be given to the study of humanitarian methods—methods which make it possible to perform dental operations free from pain.

There will be about fifty clinics selected and arranged to give the knowledge-seeking dentists the best post-graduate course that can possibly be obtained in a three days' meeting. One session will be devoted to the study of manufacturers' exhibits. The exhibits this year are to be one of the interesting features of the meeting, and the committee has been promised one of the largest exhibits shown in the country.

All communications pertaining to clinics or exhibits should be addressed to the corresponding secretary, Dr. W. G. Ebersole, 800 Schofield Building, Cleveland, Ohio.

Special rate of a fare and a third has been granted on the certificate plan by the Central Passenger Association.

The committee extend a most cordial invitation to the members of the profession to attend.

W. G. Ebersole,
Geo. H. Wilson,
Varney E. Barnes,
Ex. Com.

MINNESOTA STATE DENTAL ASSOCIATION.

The twenty-second annual meeting of the Minnesota State Dental Association will be held at Minneapolis, Minn., June 1, 2, and 3, 1905.

J. F. McCrea, *Chairman Ex. Com.*,
Minneapolis, Minn.

PHILADELPHIA DENTAL COLLEGE.

Alumni Society.

Alumni Day of the Philadelphia Dental College Alumni Society will take place June 1, 1905, at the college building, Eighteenth and Buttonwood sts. An interesting program has been arranged. The morning session will be devoted to clinics, to be given by many well-known men in the profession. At the afternoon session, Dr. Noel of Nashville, Tenn., will present a paper, for which an interesting and full discussion will be arranged. At the banquet several prominent speakers will be heard. A cordial welcome is extended to all.

S. Blair Luckie, *President*,
Max Greenbaum, *Cor. Sec'y*,
401 Weightman Bldg., Phila., Pa.

PHILADELPHIA DENTAL COLLEGE.

Class of 1895.

The tenth anniversary of the class of '95 of the Philadelphia Dental College will be celebrated by a reunion at the college, June 1, at 10 A.M.; the banquet will be at 8 P.M.

T. D. Castro, *Sec'y*,
909 Professional Bldg., Phila.

MASSACHUSETTS DENTAL SOCIETY.

The forty-first annual meeting of the Massachusetts Dental Society will be held in the Massachusetts Charitable Mechanics Association building, Huntington ave., Boston, Mass., June 7, 8, and 9, 1905. An excellent program has been arranged.

Chas. W. Rodgers, *Sec'y*,
165 Harvard st., Dorchester, Mass.

NEW JERSEY STATE DENTAL SOCIETY.

The thirty-fifth annual meeting of the New Jersey State Dental Society will be held in the Auditorium, Asbury Park, N. J., commencing July 19th, and continuing until July 22d. Headquarters will be at Hotel Columbia: rates for one person in a room $3.50, two

persons in room $3.00. The meeting will convene promptly at 10 A.M. on the 19th. The various committees have been successful in securing eminent practitioners for papers of present interest and some fifty clinicians in the most modern up-to-date dentistry. The space in the large Auditorium will be almost entirely filled with all the newest appliances in the practice of dentistry.

Friday evening will be devoted to the social side, with a smoker, including a collation and entertainment to the guests, exhibitors, and members.

Cut out now the week of July 17th, and meet with us. 756 dentists registered last July. Make it a thousand this year.

CHAS. A. MEEKER, *Sec'y*,
Newark, N. J.

INDIANA STATE DENTAL ASSOCIATION.

THE Indiana State Dental Association will meet in Indianapolis, Ind., in the Claypool Hotel, June 27, 28, and 29, 1905. A rousing meeting is promised, with numerous exhibits, on the same floor.

A. T. WHITE, *Sec'y*,
New Castle, Ind.

MICHIGAN DENTAL ASSOCIATION.

THE forty-ninth annual meeting of the Michigan Dental Association will be held at Detroit, Mich., July 10, 11, and 12, 1905. An unusually attractive program has been arranged, and the entertainment features provided by the Detroit Dental Society are to be very complete. A large attendance is anticipated.

ALBERT L. LE GRO, *Sec'y*,
Three Rivers, Mich.

GEORGIA STATE DENTAL SOCIETY.

AT the thirty-seventh annual meeting of the Georgia State Dental Society, held at Atlanta, Ga., May 4, 5, and 6, 1905, the following officers were elected: S. H. McKee, president; Wm. Crenshaw, first vice-president; T. C. Gibson, second vice-president; H. A. Lowrance, treasurer; DeLos L. Hill, recording secretary; D. H. McNeill, corresponding secretary; H. H. Johnson, journal editor. Executive Committee—W. C. Miller (chairman), W. E. Bugg, W. M. Zirkle, E. A. Tignor, Holmes Mason.

D. H. MCNEILL, *Corr. Sec'y*,
Athens, Ga.

PENNSYLVANIA BOARD OF DENTAL EXAMINERS.

THE Board of Dental Examiners of Pennsylvania will conduct examinations simultaneously in Philadelphia and Pittsburg, June 6 to 9, 1905.

For papers or further information applicants must address

N. C. SCHAFFER, *Sec'y Dental Council*,
Harrisburg, Pa.

WEST VIRGINIA BOARD OF DENTAL EXAMINERS.

THE West Virginia State Board of Dental Examiners will hold its annual meeting for examinations in Morgantown, W. Va., June 7, 8, and 9, 1905.

Applications should be filed with the secretary before June 1st. Application blanks and all necessary information will be furnished by the secretary.

H. M. VAN VOORHIS, *Sec'y*,
Morgantown, W. Va.

DENTAL COMMISSIONERS OF CONNECTICUT.

THE Dental Commissioners of the State of Connecticut hereby give notice that they will meet at Hartford, Thursday, Friday, and Saturday, June 8, 9, and 10, 1905, respectively, to examine applicants for license to practice dentistry, and for the transaction of any other proper business.

The practical examination in operative and prosthetic dentistry will be held Thursday, June 8th, at 8.30 A.M., in Putnam Phalanx Armory, corner Haynes and Pearl Streets.

The written theoretic examination will be held Friday and Saturday, June 9th and 10th, at the Capitol.

All applicants snould apply to the recorder

for proper blanks, and rules for conducting the examinations.

Application blanks must be carefully filled in and sworn to *in duplicate*, and with fee, twenty-five dollars, filed with the recorder on or before June 1, 1905.

J. TENNEY BARKER, *Recorder*,
Wallingford, Conn.

MINNESOTA BOARD OF DENTAL EXAMINERS.

THE Minnesota State Board of Dental Examiners will hold a special examination June 5, 6, and 7, 1905, in Minneapolis, at the Dental Department of the State University.

The secretary will be at the dental department on the afternoon of June 3rd to receive applications. All applications must be in by 5 P.M. of that date. Application blank will be furnished upon request, by

F. S. JAMES, *Sec'y*,
Winona, Minn.

NEW HAMPSHIRE BOARD OF REGISTRATION IN DENTISTRY.

THE New Hampshire Board of Registration in Dentistry will hold examination for candidates to practice dentistry, at the Manchester House, Manchester, N. H., June 13, 14, and 15, and December 12, 13, and 14, 1905.

A. J. SAWYER, *Sec'y*,
Manchester, N. H.

KENTUCKY BOARD OF DENTAL EXAMINERS.

THE Kentucky State Board of Dental Examiners will meet for examination of candidates June 6, 1905, at the Gaulbut building, Louisville, commencing at 9 A.M. Candidates will be examined in the following subjects: Anatomy, physiology, materia medica, pathology, histology, operative dentistry, oral surgery, chemistry, metallurgy, and prosthetic dentistry.

A general average of seventy-five per cent. is required. Candidates must come prepared with instruments (except engine) and material (gold) to fill at least one tooth; also a metal case of not less than four teeth (bridge or plate) invested, and ready to solder before the board. Candidates will be required to certify that all work on metal case was done by them, and must be graduates of reputable dental colleges.

Application for examination must be made on blanks furnished by secretary, and must be accompanied by a fee of $20.00.

C. R. SHACKLETTE, *Sec'y*,
628½ Fourth ave., Louisville, Ky.

VIRGINIA BOARD OF DENTAL EXAMINERS.

THE Virginia State Board of Dental Examiners will meet at the University College of Medicine, Richmond, Va., the second Tuesday in June 1905, at 9 A.M.

R. H. WALKER, *Sec'y*.
Norfolk, Va.

MASSACHUSETTS BOARD OF REGISTRATION.

A meeting of the Massachusetts Board of Registration in Dentistry, for the examination of candidates, will be held in Boston, Mass., June 21, 22, and 23, 1905.

All applications, together with the fee of twenty dollars—if first examination—must be filed with the secretary of the board on or before June 14th, as no application for this meeting will be received after that date.

Hereafter candidates for second and subsequent examinations will be required to fill out an application blank and forward it to the secretary as above.

The fee for third and subsequent examinations is $5.00.

G. E. MITCHELL, *Sec'y*,
Haverhill, Mass.

RHODE ISLAND BOARD OF REGISTRATION.

THE next meeting of the Rhode Island Board of Registration in Dentistry for the examination of candidates will be held at the Statehouse, Providence, R. I., June 27, 28, and 29, 1905.

All applications, together with the fee of twenty dollars, must be in the hands of the secretary not later than June 20th.

W. S. KENYON, *Sec'y*,
301 Westminster st., Providence, R. I.

NORTH CAROLINA BOARD OF DENTAL EXAMINERS.

THE North Carolina Board of Dental Examiners will hold its annual meeting for the examination of applicants to practice dentistry on June 26, 27, and 28, 1905, at Waynesville, N. C.

For further information address

R. H. JONES, *Sec'y*,
Winston-Salem, N. C.

WISCONSIN BOARD OF DENTAL EXAMINERS.

THE next meeting of the Wisconsin State Board of Dental Examiners for examination of candidates for license to practice dentistry in Wisconsin will be held in Milwaukee, June 26, 1905, at the Wisconsin College of Physicians and Surgeons, corner Fourth st. and Reservoir ave.

Application must be made to the secretary fifteen days previous to the examination. The candidate must be a graduate of a reputable dental college, or have been engaged in the reputable practice of dentistry consecutively for four years, or an apprentice to a dentist engaged in the reputable practice of dentistry for five years.

For further particulars apply to

J. J. WRIGHT, *Sec'y*,
1218 Wells Bldg., Milwaukee, Wis.

SOUTH CAROLINA BOARD OF DENTAL EXAMINERS.

THE South Carolina Board of Dental Examiners will meet in annual session at White Stone Springs, July 14, 1905, for the purpose of examining applicants. Examinations will be both theoretical and practical. Applicants must furnish instruments, material, and patients for any demonstration called for by the board.

B. RUTLEDGE, *Sec'y*,
Florence, S. C.

VERMONT BOARD OF DENTAL EXAMINERS.

THE next meeting of the Vermont Board of Dental Examiners for the examination of candidates to practice dentistry will be held at Montpelier, July 5, 6, and 7, 1905, commencing at 2 P.M. on the 5th. Headquarters will be at the Pavilion Hotel.

All applications, together with the fee of twenty-five dollars, must be in the hands of the secretary not later than June 25th. For information apply to

GEO. F. CHENEY, *Sec'y*,
St. Johnsbury, Vt.

NORTH DAKOTA BOARD OF DENTAL EXAMINERS.

THE North Dakota Board of Dental Examiners will hold the next examination July 11, 12, and 13, 1905, at Grand Forks, N. D. Applications should be filed with the secretary before July 12th.

H. L. STARLING, *Sec'y*,
Fargo, N. D.

DENTAL EXAMINERS OF THE DISTRICT OF COLUMBIA.

THE semi-annual examination of the Board of Dental Examiners of the District of Columbia will be held July 5, 6, and 7, 1905.

All applications for examination must be accompanied by a fee of ten dollars, and should be filed with

SHELDON G. DAVIS, *Sec'y*,
607 Thirteenth st., Washington, D. C.

NEW JERSEY BOARD OF REGISTRATION.

THE New Jersey State Board of Registration and Examination in Dentistry will hold its semi-annual examination in the theoretical branches in the assembly chamber of the Statehouse at Trenton, N. J., July 11, 12, and 13, 1905. Practical prosthetic work will be done at the office of A. Irwin, 425 Cooper st., Camden, N. J.; practical operative work at the office of Charles A. Stockton, 22 Central ave., Newark, N. J.

All applications must be in the hands of the secretary ten days prior to the examination. Fee for examination $25.00.

For information apply to

CHAS. A. MEEKER, *Sec'y*,
29 Fulton st., Newark, N. J.

OHIO BOARD OF DENTAL EXAMINERS.

THE regular semi-annual meeting of the Ohio Board of Dental Examiners will be held in Columbus, June 27, 28, and 29, 1905, at the Hartman Hotel.

Applications for examination should be filed with the secretary by June 17th. For further information address

H. C. BROWN, *Sec'y*,
185 East State st., Columbus, O.

SOUTH DAKOTA BOARD OF DENTAL EXAMINERS.

THE next meeting of the South Dakota State Board of Dental Examiners will be held at Mitchell, S. D., July 11, 1905, beginning at 1.30 P.M.

All candidates will be required to perform practical work in both operative and prosthetic dentistry, and should bring all instruments and materials necessary. Vulcanizer, lathe, and swaging appliances will be furnished by the Board. Application, together with fee of ten dollars, must positively be in the hands of the secretary before July 7th.

G. W. COLLINS, *Sec'y*,
Vermillion, S. D.

IOWA BOARD OF DENTAL EXAMINERS.

THE next meeting of the Iowa State Board of Dental Examiners will be held at Iowa City, June 12th and 13th instead of the 15th.

E. D. BROWER, *Sec'y*,
Le Mars, Iowa.

DENTAL COLLEGE COMMENCEMENTS.

INDIANA DENTAL COLLEGE.

THE twenty-sixth annual commencement exercises of the Indiana Dental College (University of Indianapolis, Department of Dental Surgery) were held Monday, May 8, 1905.

An address was delivered by Fasset A. Cotton, state superintendent of public instruction.

The degree of Doctor of Dental Surgery was conferred by Dr. John N. Hurty, president of the board of trustees, on the following graduates:

J. B. Banks	F. Earhart	W. R. Kirtley	S. E. Shoemaker
A. G. Barrett	Frank Fay	T. F. Lewis	A. R. Shonkwiler
H. P. Brand	Theo. Fullen	Burt Mangold	L. F. Smith
E. V. Bull	O. B. Galloway	H. H. Meier	J. H. Sommers
J. C. Canfield	R. G. Haas	Harry Miller	O. E. Stiver
J. M. R. Canfield	Dillon Hacker	Wm. Miller	Hubert Stoddard
J. B. Carr	C. B. Hamilton	H. L. Murphy	Arthur Timmis
Jno Cloyd	Walter Harding	Howard Myers	J. E. Whitney
C. R. Cofield	Wallace Hardwicke	J. B. Needham	B. A. Widup
C. S. Coppock	F. W. Harrold	Harry Parr	Carl Will
F. E. Cording	Jos. Hefele	Frank L. Patterson	Sarah Willey
R. J. Coss	P. Hemsley	Fred I. Patterson	H. M. Williams
G. K. Croker	J. T. Hoopingarner	S. E. Ratcliffe	W. L. Withers
S. J. Cunningham	Fred R. Houck	W. G. Rice	G. E. Wright
C. R. Davis	C. C. Howell	J. M. Richer	H. M. Yaple
O. A. Day	H. R. Hunter	E. M. Risacher	Collins Yerxa
P. G. Dixon	Geo. Jackson	G. W. Russell	J. O. Zubrod
L. W. Downs	Frank Kimberlin	Jas. C. Schermerhorn	

NEW ORLEANS COLLEGE OF DENTISTRY.

THE annual commencement exercises of the New Orleans College of Dentistry were held Wednesday, May 3, 1905, at the Tulane theater, New Orleans, La.

The annual oration was delivered by Hon. Jared Y. Sanders and the valedictory by E. E. Soulier.

The degree of Doctor of Dental Surgery was conferred by Dr. E. B. Craighead on the following graduates:

Chas. Alleman	J. J. Clarke	A. H. Grimmer	W. F. Levert	Albert Rodriguez
R. R. Bailey	M. Cognovich	S. J. Harrell, Jr.	W. H. McNiel	Gab. Samaniego
L. Barnett	A. H. Cohen	W. L. Holt	E. S. Magner	E. E. Soulier
W. B. Barry	Leo. Dempsey	L. A. Hooper	H. M. Moore	E. G. Triay
D. A. Burchfield	Rene Esnard	J. H. Le Blanc	R. Patin	Benj. Vidaurre
F. E. Cazayoux	J. A. Evans	J. A. Leggett	N. F. Roberts	Geo. Wilbert
E. J. Cherault				

KANSAS CITY DENTAL COLLEGE.

THE twenty-fourth annual commencement exercises of the Kansas City Dental College were held in the Central High School Auditorium, Thursday, May 11, 1905.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Emery Hallick Ballou	Swend A. Hanson	Samuel Haggett Stewart
Charles Earle Beeler	John James Helm	Joshua Rollo Stone
Atwell Lee Benton	Durward Belmont Hunter	Louis Marion Swaney
Bertrum Alvin Bussard	Elmer Austin Hunter	John W. Thimes
John Wesley Coggins	William J. Keys	A. Todd Watkins
Thomas Jefferson Collins	Alfred William Leonard	Guy Irwing Watson
Frederick David Combs	William Harrison McBride	Arthur Jacob West
Lawrence Dillman	Roy Melvin Matthews	Frank Bradley Wilcox
Joseph Adolphas Drake	Calvin Floyd O'Bryon	William A. N. Wilkening
Joseph Herbert Dyer	Samuel Everhart Osborn	Daniel Lutz Williams
Clifford Phillips Elder	William Benjamin Petry	Clarence D. Wilson
Claude Ellis	William Henry Pugh	Clarence Bauduy Workman
Jay Carlton Gahagen	Jay Ward Smith	John Edwin Zimmerman
Henry Dawson Gilley	George B. Snyder	Homer Abraham Sager
Percy Bruce Graham	Edward B. Sperry	George W. Shally
William Edward Gregory	Maurice Mervin Speyer	Albert Sidney Johnson

CINCINNATI COLLEGE OF DENTAL SURGERY.

THE twelfth annual commencement exercises of the Cincinnati College of Dental Surgery (Dental Department of Ohio University) were held on Tuesday, May 9, 1905.

The valedictory address was delivered by Rev. C. W. Blodgett.

The degree of Doctor of Dental Surgery was conferred by Hon. H. L. Gordon, president of the board of trustees, on the following graduates:

David R. Apple	Ohio	Earl J. Hill,	Ohio
L. Geo. Beerbower	West Virginia	Otto A. Hille	Ohio
Einar T. Breeding	Kentucky	J. Robbins Hull	Ohio
Philip P. Carlin	Ohio	Howard H. Hynes	Kentucky
J. Elmer Connley	Kentucky	Ira H. Strafford	West Virginia
Frank L. Davison	Ohio	Jonathan Stevens	Ohio
Thomas F. Edwards	Ohio	Will. H. Stone	West Virginia
Arthur H. Fulkerth	Ohio	Bertha W. Troehler	Ohio
Samuel C. Gates	Kentucky	Hanson L. Ward	Ohio
Horace G. Glew	Ohio	James G. Wilson	Ohio
Homer E. Hewins	Kentucky	Chas. J. Zimmer	Kentucky

NORTH PACIFIC DENTAL COLLEGE.

THE annual commencement exercises of North Pacific Dental College were held in the First Baptist church, Portland, Oregon, Tuesday evening, May 2, 1905.

The annual address was delivered by the Hon. Alfred F. Sears, and the valedictory by Benj. Norman Hamm, A.B., D.M.D.

The degree of Doctor of Dental Medicine was conferred by Dr. B. F. Eshelman on the following graduates:

Jack Aylwin
George J. Bacher
Chester F. Becker
M. M. Bettman
Robert N. Brewster
Henry E. Burmester
Cornelius S. Collier
Harry G. Davis
Walter S. Dorfner
James F. Drake
Solomon C. Endicott
Ellis B. Flett
Walter M. Gallagher
John Gill
Benj. N. Hamm
Henry A. Harr
William E. Hartel
Frank DeF. Hasbrouck
Edward Herstel
Cornelius S. Kelsay
Albert W. Kinney
Yo Taro Kondo
Arthur W. Lister
Earl C. McFarland
Alexander MacDougal
Tom Mesdag
Chester A. Morris
Herbert A. Moss
Bert C. Olinger
Milford A. Price
Alton D. Remington
Orville R. Reyburn
Bert E. Schoonmaker
Urias B. Shantz
Henry B. Sook
Ralph C. Swinburn
Dana I. Wadsworth
William A. Waldew
Lewis F. Walker
Edward H. White
Anna L. Yates

WASHINGTON UNIVERSITY—DENTAL DEPARTMENT.

MISSOURI DENTAL COLLEGE.

THE annual commencement exercises of the Missouri Dental College were held in Memorial Hall, St. Louis, Mo., Wednesday, May 3, 1905.

An address was delivered by William L. Mason, LL.D., and honors were awarded by Dr. J. H. Kennerly, dean.

The degree of Doctor of Dental Surgery was conferred by the chancellor, Winfield S. Chaplin, on the following graduates:

Allie K. Adams.....Missouri
Alexander Bailey.....Texas
George W. Baldwin.....Illinois
Fred'k J. Bartel.....Illinois
James T. Biggs.....Missouri
Walter H. Blanck.....Illinois
William A. Bleke.....Indiana
Ewing P. Brady.....Missouri
Ernest O. Brewington.....Texas
Clyde F. Caldwell.....Kansas
Fletcher W. Carter.....Missouri
Adolph F. Dueber.....Missouri
Harry E. Dowell.....Arkansas
Leopold A. Ellenburg.....Missouri
Harry R. Faherty.....Missouri
August T. Gast.....Missouri
Harry J. Green.....Missouri
Theodore F. Hafner.....Missouri
Henry F. Hageman.....Missouri
Joseph D. Hayward.....Missouri
Rudolph G. Heidinger.....Illinois
Charles W. Hodges.....Missouri
Fred'k W. T. Horstman.....Missouri
Walter L. Hudson.....Missouri
Glover Johns.....Texas
Charles W. Kennerly.....Missouri
Joseph F. Kimball.....Kansas
William V. King.....Missouri
Charles E. Knepp.....Mexico
Emil D. Lambrechts.....Missouri
Werner L. Lemberg.....Missouri
William H. Lence.....Illinois
Charles W. Lentz.....W. Virginia
John M. Lonergan.....Missouri
Leo H. Lattes.....Missouri
Cornelius B. Mueller.....Illinois
Florian A. Neuhoff.....Illinois
Harvey B. Owsley.....Ohio
Alfred G. Scheik.....Missouri
Leslie M. Scott.....Missouri
Rudolph C. Seibert.....Illinois
Carl F. Seivert.....Missouri
Edward E. Sharp.....Missouri
Romie B. Shields.....Missouri
Walter S. Spencer.....Missouri
Otto E. Spiller, M.D.....Missouri
Robert O. Steinman.....Illinois
Thomas J. Sugg.....Missouri
Edgar B. Trail.....Missouri
Thomas T. Umbarger.....Missouri
Roy T. Villars.....Indiana
Robert Wallis.....Illinois
George F. Watson.....Missouri
Harry B. Weber.....Missouri
August Westerfeld.....Missouri
Rolla G. Williams.....Illinois
Joseph S. Wolff.....Missouri

BIRMINGHAM DENTAL COLLEGE.

THE annual commencement exercises of Birmingham Dental College were held at Jefferson Theater, Birmingham, Ala., Tuesday evening, May 2, 1905.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Thomas C. Bibb	Ellis P. Brown	Herbert E. Knight	Lola Taylor
James A. Blue	Edwin H. Cater	John D. Proctor	Moses T. Whitted
Harry Bradford	Harry D. Denegre	William W. Stallworth	

UNIVERSITY OF MARYLAND, DEPARTMENT OF DENTAL SURGERY.

THE annual commencement exercises of the Department of Dental Surgery of the University of Maryland were held in Chase's Lyceum theater, Baltimore, Md., May 8, 1905.

An address to the graduates was delivered by Rev. Wilbur Fletcher Sheridan, D.D., and the class oration was delivered by Horace M. Davis.

The degree of Doctor of Dental Surgery was conferred by Bernard Carter, esq., provost, on the following graduates:

John Clarence Allen	New York
Marius Archambault	Rhode Island
William James F. Barton	New York
Harry G. Blatt	Maryland
A. Stanley Brown	Maryland
Lewis Rogan Brown	Arizona
Samuel Blessing Brown	Maryland
Walter G. Bush	New York
Henry A. Cherry	New York
Oran Laverne Cochrane	California
Richard Speight Cutchin	Virginia
Ernest Lee Davis	Maryland
Horace M. Davis	Maryland
G. Fletcher Dean	West Virginia
George Edward Dennis	North Carolina
Richard Tozer Dial	South Carolina
Wilford Eugene Dimock	Canada
Arthur M. Dula	North Carolina
Joseph Henry Dunne	Massachusetts
F. P. Edgell	West Virginia
Bates Etchison	Maryland
John William Findon	Maryland
Joseph Hewitt Findon	Maryland
Ethan W. Foster	South Carolina
Athol Lee Frew	New York
Frederick Roy Graham	New Brunswick
George Henry Hague	New Jersey
Nathan Greene Hall	Rhode Island
William Luther Hand	North Carolina
Peter Thomas Healey	New York
Leon Wesley Helms	New York
Gould O. Hildebrand	Virginia
George Edward Hill	Maine
R. Fulton Holliday	North Carolina
J. Stephenson Hopkins	Maryland
S. Robert Horton	North Carolina
J. William Hotchkiss	Connecticut
E. Jerome Jenkins	Maryland
J. V. Jenkins	Virginia
James Joseph Kenney	New York
John Pugh Lamb	North Carolina
Bliss Allen Lester	Canada
David A. Levy	Maryland
Oscar Mauritz Lind	Maryland
Bert Reade Long	North Carolina
John J. McCann	New York
Joseph L. McClung	West Virginia
Frank Wilson McCluer	Virginia
M. Jordan McFadden	South Carolina
Walter Roberts McIntire	Connecticut
H. Howard McLaughlin	Pennsylvania
Arthur Wellington MacVane	Maine
E. Whit Miller	Virginia
John E. C. Miller	Pennsylvania
Samuel Ferrell Moffett	Texas
Ellis Frederick Moyse	Canada
Reuben B. Mullins, M.D.	Nebraska
Otto Nase	New Brunswick
Wilbert Price	Maryland
Wilbert Thomas Pyles	Maryland
William Henry Riley	Vermont
Joseph Ross	New Jersey
I. Ruffin Self	North Carolina
Calvin H. Skaggs	West Virginia
Charles L. Snively	Maryland
George A. Snyder	Pennsylvania
W. Harry Sperow	West Virginia
Christian Henry Steinbeck	West Virginia
James E. Waltman	Maryland
Guernsey George Wareheim	Pennsylvania
Andrew Jackson Whisnant	North Carolina
Charles Joseph Wells	Maryland
John Edward Welsh	South Carolina
Henry Fletcher Wood	Virginia
Henry F. Woodward	West Virginia
Rev. V. K. Yacoubyan	Egypt

VANDERBILT UNIVERSITY, DEPARTMENT OF DENTISTRY.

THE annual commencement exercises of the Department of Dentistry of the Vanderbilt University were held in the University chapel, Nashville, Tenn., Saturday, May 6, 1905.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Spencer Marks Adams
John George Bauer
Wilson Franklin Beavers
William Dake Campbell
Milton Clyde Carnell
Clifford B. Feagin
Grant Barnes Fitzwater
Alfred Malcom Forester
Virgil Victor Florence
Charles Blakely Geisinger
Hugh C. Howser
Ben Howard Johnson
Archibald Lawson, Jr.
Charles Thomas Love
Evander Washington McNeil
Murray Thornton McNeil
Joseph Franklin McCormick.
Robert Spencer Marlin
James William Matthews
William Garnett Merrill
James Lewis Miller
William Robert Middleton
Thomas George Morrow, Jr.
Robert Emmette Murphy
Sewell Holt Northcross
Oliver John O'Neal
Wayne Overstreet
Frank Stone Osborne
Baldwin Shelton
Robert Carl Snow
Walter Felix Turnipseed
James Sharp Vaughn
William Kirkland Walker
Jesse Lee Wilson
Saul Greeley Workman
Charles Henry Young

BALTIMORE COLLEGE OF DENTAL SURGERY.

THE annual commencement exercises of the Baltimore College of Dental Surgery were held at Chase's theater, Baltimore, Md., Friday evening, May 12, 1905.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Miss S. S. Ackerman	Maryland
J. R. Ames	Virginia
V. B. Ames	Maryland
J. N. Arvin	Texas
G. R. Barringer	North Carolina
J. C. Bickel	Virginia
H. A. Bishop	Canada
R. K. Boyer	Pennsylvania
P. W. Boylan	Massachusetts
J. Brown	New York
D. F. Burke	New York
F. W. Cairns	Massachusetts
C. J. Carey	Massachusetts
J. A. Cathcart	Pennsylvania
P. E. Clark	Rhode Island
J. F. Clements	Massachusetts
G. W. Deming	New York
F. M. de St. Guay	New York
John E. Ely	New York
W. R. Farnsworth	New York
H. Furschbach	New Jersey
E. C. Gernhard	Ohio
R. A. S. Gildea	New Jersey
J. Godfrey	Ohio
F. J. Hall	Maryland
H. W. Hawley	Connecticut
K. P. Heintz	Maryland
R. M. Hite	West Virginia
J. H. Hoffman	Maryland
H. S. Hurley	Georgia
J. J. Keator	New York
R. A. Kruchbaum	Maryland
G. W. La Liberte	New York
E. Lay	Texas
H. Levin	Connecticut
J. L. Loftus	Massachusetts
J. H. McClune	Pennsylvania
C. McDermott	New Jersey
G. H. McDonald	Canada
A. W. McKay	P. E. I.
W. C. McLaughlin	Connecticut
W. C. McLeod	Maine
H. E. Mann	Canada
J. Manning	Canada
H. A. Martin	Rhode Island
C. H. Masters	Louisiana
F. H. May	Ohio
S. Metzler	Canada
W. R. Merriam	Maryland
J. O. Miner	Connecticut
C. J. Moore	Connecticut
C. F. Morrissey	Connecticut
W. H. Mulhall	Canada
C. E. Mullen	Maryland
G. W. O'Brien	Canada
F. O'Loughlin	Connecticut
J. A. O'Toole	Illinois
A. C. Parr	Maryland
D. W. Pineo	Canada
H. F. Pinnell	West Virginia
A. Pobirsky	Rhode Island
N. F. Praed	New Jersey
R. H. Ramsey	Oklahoma
G. Salisbury	Maine
E. C. Saylor	Pennsylvania
H. D. P. Scheurerman	Maryland
G. C. Shoaf	Texas
A. H. Smallwood	Canada
C. E. Smith	Pennsylvania
J. F. Tracy	Massachusetts
T. Tunney	Connecticut
R. W. Webb	Maine
A. G. Westwood	Ohio
C. E. Westwood	Ohio
M. A. Whalon	New Jersey
J. F. Worrell	Canada
H. Yelverton	North Carolina

CHICAGO COLLEGE OF DENTAL SURGERY.

THE twenty-third annual commencement exercises of the Chicago College of Dental Surgery were held Tuesday, May 2, 1905, at the Garrick theater, Chicago, Ill. Addresses were delivered by Geo. E. Vincent, Ph.D., J. Newton Roe, A.M., Sc.D., and Rt. Rev. Samuel Fallows, D.D., LL.D.

The degree of Doctor of Dental Surgery was conferred by the president, Truman W. Brophy, M.D., D.D.S., LL.D., on the following graduates:

Albert Benton Ames
William Conrad Appel
Frederick Albert Axon
Roy Harold Banks
Levi Duke Barnum
Roy Alvah Barron
John Bernhardt
Michael Joseph Bisco
Robert Peter Booth
Ira E. Boyer
John Oliver Brake
Arthur Alfred Brecheisen
Richard Max Bromund
Oliver Hyer Budge
George Merton Burdick
Eugene Rolla Butts
James Salmon Calderwood
Albert Douglas Callum
Thomas Michael Cannon
James Hartwell Cardwell
Earl H. Chappelle
Grattan Doran Connell
Joseph Emmett Cummings
Joseph Allen Daniel
Richard Henebery Daniels
Jay Garfield Davies
Delmer Coast Davenny
James Kendrew Day
Bruce B. Devlin
Carl Asa Dickinson
Andrew Dimond
Januarius William Dimond
Harry Emmett Donahoe
John James Donelan
William Douglas Dunlop
Leslie Eugene Eaton
Friend Richard Eccles
Lloyd Roscoe Eller
Friend Eccles Elliott
Edward Lemotte Eustice
Guy Edwin Farley
Herman Frederick Flemming
Thor Fritjof Fossum
Lewis Ray Frace
Fernando William Fuermann
Philys Stamor Gardner
William Garfield Gates
Hubert Marion Glew
J. Luman Godfrey
James Goldring
George Maxwell Gorrell
Leon Gregory Gross
Thomas Porter Gunning
Lee Erwin Haight
Rupert Estell Hall.
Robert Elmer Handley
Bruno Henry Harms
Charles George Hartley
Henry Welch Hastings
Karl Frederick Hausmann
Owen Clyde Hays
Homer Cleveland Hendricks
John Emil Hoffman
John Frederick Hohenadel
Harold Edwin Holbrook
Claud Bowers Hostetler
Gilbert Andrew Howatt
George R. Howe
Earl James Huston
Glenn Downing Hughes
Walter Lloyd Hyde
Otto Earl Jelinek
Edgar Vance Jones
Harry Neville Jones
Ernest Kelly
James Aloysius Kerrigan
Charles Raymond Knight
Harry Irving Kramer
Manley Robert Lappin
Lars Aloff Larson
Max Levy
Bradley Wills Linscott
Edwin Lem Long
William Frederick Lubahn
Daniel Jennings McCartan
Joseph McKee McCullough
Louis Charles McDonald
Martin Laurance McEvoy
Duncan William McEwen
William Ivey Macfarlane
William Randolph McKinley
George Mathew McMann
Edwin Barrion Main
John Arthur Manning
Ralph Charles Matteson
Charles Bryant Mead
John Mietus
Samuel E. Miller
Herbert Calder Mitchell
Franklin Gifford Moore
Fred Speed Morrell
Arthur Wellington Morris
Lucius Wayland Munger
Edward Ferdinand Museus
Harry Grant Nelch
Charles John Nenahlo
Gordon Balgarnie New
George Henry Newhouse
Joseph Newton Novashelsky
Emil Edward Nussle, Jr.
Henry Elton O'Neal
Franklin Cook Osgood
Walter Thomas Page
Archibald Bennett Patterson
Leland Edward Phelps
Otto Carl Rather
Per P. Raynsborg
Alva Guy Reardon
Franklin John Reiber
William Henry Reid
Miner Thomas Richards
Clifton Reed Robinson
Brant Cotter Ross
William Aaron Roth
Frank Leo Ryan
William Virgil Ryan
Roland Purcell Saunders
Edward Lynn Sawyer
William Frederick Schatz
James Oakley Schoonmaker
Carl Milton Schwendener
Augustus Jacob Scritsmier
Augustus David Shaffer
Simon Burtrum Shaeffer
Samuel James Shaw
Henry William Silvernale
Guy Vinton Smith
J. Lancie Smith
Roy Bryant Smith
Oscar George Specht
Lorne Daniel Steele
Frank A. Stewart
Perry Gilfred Stordock
Morbeck William Sumner
Philip Meck Swinehart
Albert Henry Tanner
Wilhelm Thiersch
Herbert Lewis Thorp
D'Enice Theophilus Throndson
Garnet Beverly Tovell
Horace Lee Trafford
Halsey Van Doren
Homer Frederick Van Drezer
Leo John Viall
Leon William Viall
Harry Clifton Wands
Owen Clarence Watson
Samuel Frederick Webert
Clyde C. West
Willie Ernest West
Yott Edward Whitmore
Homer Rex Whitney
Chester Herbert Willey
Paul George Wilson
Otto Peter Wiltz
Lockwood Wing Yates
John Quigley Young
William Edward Young

PITTSBURG DENTAL COLLEGE.

THE annual commencement exercises of the Pittsburg Dental College were held in Duquesne Theater, Pittsburg, Pa., at 2 P.M., Wednesday, May 3, 1905.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Joseph A. Allen
Jonathan W. Anderton
D. Shepard Ashcom
J. Herbert Balsinger
Guy Fortney Bayly
Foster G. Bender
James C. Bingham
Joseph A. Boarts
Cecil O. Booth
Charles Elmer Brinkman
Edgar E. Cochran
W. Garrette Cole
Arthur G. Copeland
Frank D. Couch
Harry R. Craig
Milo Garfield Cratty
Howard Crawford
F. Wallace Cunningham
Walter E. Davidson
B. R. Davis
Fred'k Howard Deterding
H. Eckley
W. J. Elliott
Howard W. Ford
Wm. H. Gallagher
J. M. Jones
W. A. Kelly
Wm. H. Kent
Cleon O. Lee
Edw. L. Leonard
Addison B. Linhart
Paul Livingston
Harry D. Lyon
Edwin G. Masters
F. Rudy Mellon
Walter E. Mendel
Geo. G. Meyer
James W. Miller
John A. Miller
Clarence S. McCord
Ira C. McCue
Chas. V. McKelvey
John McNaughton
Earl H. Park
M. O. Pesor
C. Maurice Roland
Fred'k E. Sanders
Chas. S. Schumaker
John B. Scott
Harry Seegman
E. Frank Shaulis
LeRoy B. Simons
Harry S. Smith
O. Albert Stewart
P. Raymond Stone
Wm. H. Stroup
Ralph C. Tannehill
Germaine C. Wehrle
Harry J. Welch
Sam'l S. Wells
Albert T. Wise

UNIVERSITY OF TENNESSEE—DEPARTMENT OF DENTISTRY.

THE twenty-seventh annual commencement exercises of the Dental Department of the University of Tennessee were held Thursday, May 4, 1905, in Watkins Hall, Nashville, Tenn.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Robert Cæsar Alexander	Tennessee
E. H. Anderson	Mississippi
Carl E. Bailey	Texas
Harris Augustus Bell	Mississippi
J. T. Carden	Kentucky
Walter De Jarnette Coleman	Mississippi
Curtis Crownover	Arkansas
William C. Dennis	Mississippi
Beamon H. Edwards	Mississippi
James Cicero Gamble	North Carolina
W. O. Gordon	Tennessee
Fred B. Guinn	Texas
Albert G. Hollingsworth	Mississippi
James Echols Hudson	Tennessee
Evan G. Huston	Texas
Will G. Jarnagin	Tennessee
William C. Jones	Texas
C. H. Kennedy	Louisiana
William H. Keown	Kentucky
Miss De Lan Kinney	Tennessee
Andrew J. McMackin	Tennessee
Whitman Lamar Mounce	S. Carolina
Edward J. Murphy	Mississippi
Chas. C. Murray	Tennessee
Mrs. Wayne Humboldt Neville	Kentucky
Benton McMillin Pipkin	Tennessee
Carl Marvin Puryear	Kentucky
Reube Reynolds Ratliff	Mississippi
John Alfred Roberson	Tennessee
Robert Harrison Roux	Florida
J. Lee Stanfill	Tennessee
Alva Bryan Stewart	Tennessee
George Johnson Sugg	Kentucky
Wilbur B. Summers	Tennessee
John D. Weldon	Tennessee
C. S. Wheeler	Texas
James Erskin Wilson	Mississippi

BARNES DENTAL COLLEGE—DENTAL DEPARTMENT, BARNES UNIVERSITY.

THE second annual commencement exercises of the Barnes Dental College were held in the Y. M. C. A. Hall, St. Louis, Mo., Wednesday evening, May 3, 1905.

The doctorate address was delivered by Prof. E. R. Meng, M.D.

The dean of the faculty, Burton Lee Thorpe, M.D., D.D.S., conferred the degree of Doctor of Dental Surgery upon the following graduates:

Frank H. Lohmeyer..... Missouri	Lawrence H. O'Brien..... Missouri
William L. Lynes..... Missouri	William A. Solomon..... Illinois
Thomas F. Magers..... Iowa	Cleo P. Strawn..... Missouri
Joseph M. McKim..... Missouri	

First honorable mention for best general examination awarded to Cleo Park Strawn, D.D.S. Second honorable mention awarded to William A. Solomon, D.D.S.

ATLANTA DENTAL COLLEGE.

THE annual commencement exercises of the Atlanta Dental College were held in the Grand Opera House, Atlanta, Monday evening, May 1, 1905.

The valedictory was delivered by W. H. Fields, D.D.S.

The degree of Doctor of Dental Surgery was conferred by Hon. W. R. Hammond on the following graduates:

I. H. Archer	R. L. Ellison	W. N. Leavell	J. V. Seigler
K. R. Armstrong	W. H. Fields	R. A. Little	G. E. Sewell
R. L. Arnold	C. B. Gamble	W. W. Lufburrow	L. E. Shealy
E. S. Ayers	S. A. Gaulding	W. W. McCorquodale	W. H. Sherard
J. B. Bardin	W. A. Gove	J. B. McKinnon	T. B. Shipp
C. M. Beam	F. L. Green	S. E. Malone	C. T. Shoemaker
J. H. Boston	F. P. Hamilton	T. L. Massey	W. B. Simmons
J. W. Bradley	W. J. Harper	W. C. Milhous	W. L. Smith
O. H. Brock	J. H. Hawthorn	G. A. Milner	H. L. Spearman
L. J. Brock	J. H. Haynsworth	H. H. Mobley	J. B. Stallworth
A. B. Brown	C. J. Hicks	T. F. Montgomery	J. W. Thurmon
J. S. Byrd	W. H. Hoyl	R. Morlote	G. C. Ward
G. E. Calvert	G. C. Hunter	W. L. Northen	S. P. Warrenfells
G. C. Crawford	S. A. Hussey	W. F. Owen	G. C. Watson
C. V. Crawford	F. M. Jenkins	A. W. Patton	C. H. Wells
R. A. Davidson	M. B. Johnston	Miss G. Philipps	J. D. Westbrook
H. B. Dawson	S. W. Johnston	R. L. Roberts	J. T. Whitlaw
J. A. Dobey	J. B. Kelly	S. F. Ross	S. T. Worley
J. R. Durham	E. G. Kirven	R. H. Saunders	L. G. Youmans
S. O. Edwards	J. B. Knighton		

SOUTHERN DENTAL COLLEGE.

THE eighteenth annual commencement exercises of the Southern Dental College were held in the Grand Opera House, Atlanta, Georgia, April 29, 1905.

The annual oration was delivered by Judge Spencer Atkinson.

The degree of Doctor of Dental Surgery was conferred by Howard Van Epps, president of the board of trustees, on the following graduates:

Herbert Wightman Ackerman. S. Carolina	Business Easmon Hall..... Georgia
LeRoy Willson Austin..... Georgia	Theodore Augustus Hargrove.. N. Carolina
Harry Joseph Babin..... Louisiana	Walter Clifford Hodnett..... Georgia
Marion Adolphus Beall..... Georgia	Martin Walter Knowles..... Florida
George William Bledsoe..... Georgia	Dozier Leitner ..... Florida
Buford Francis Boykin..... Georgia	Thomas James McDonald..... Georgia
James Abner Broach..... Alabama	Thomas Hughes McEntyre..... Alabama
Norman Luther Bryan..... N. Carolina	Bascom Xenophone Minus..... S. Carolina
Hugh J. Burnham..... Mississippi	Winfield Scott Pearce..... Georgia
Walter James Colclough..... Georgia	John Vincent Pierson..... Alabama
Lucius Ethril Cox..... Georgia	Ramon de Poo..... Cuba
Ezekiel Pingree Crawford..... Georgia	Paul Ayres Pressly..... S. Carolina
Pete Bernabe Dominguez..... Mexico	Joseph Emile Psayla..... Louisiana
Emil Eisenberg ..... Georgia	Brutus Cassius Roberts..... Texas
David John Fail..... Alabama	John Clarence Russell..... Mississippi
John Clifford Foster..... Alabama	Nathaniel Isaiah Savant..... Louisiana
William Arthur Geiger..... Georgia	Josiah W. Sirmans..... Georgia
Charles Sterling Gibson..... Georgia	Robert H. Truesdel..... S. Carolina
Laurence C. Graham..... Georgia	Pickens Lester Watson..... Georgia
William Haslam Hafer..... Georgia	Henry Reddick Wells..... S. Carolina

UNIVERSITY OF BUFFALO, DEPARTMENT OF DENTISTRY.

THE thirteenth annual commencement exercises of the Department of Dentistry, University of Buffalo, were held in the Teck theater, Thursday, May 4, 1905.

An address was delivered by Rev. Richard Earle Locke.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Albert Edwin Atkinson
Heman Wing Backus
Roscoe Lyman Barber
Frank Albert Beyer
Irving M. Billington
Frederick Edwin Bryant
Charles Frank Bullock, A.B.
Cephas Rowland Campbell
Daniel D. Carmichael
Walter Frank Chappelle
Clark George Cole
Hugh Cunningham
Burt Brook Davis
Albert Francis Dyer
Harry Franklin Eckler
Seward Crapser Edgerly
Frank Washington Edmunds
George M. A. Empey
James Edward Espie
Frank Matthew Evans
Ernest John Eveleigh
Guy Maxwell Fiero
Allen Joseph Fraley
Edgar Sumner Gill
Carl DuMelt Gurnee
Frank James Handy
Dan Raymond Howe
Charles Hugh Irish
Joseph Justus Jacobson
Frederick Henry Jelley
Harold Francis Jones
George Burnett Kehr
Milton Wesley Kohler
Frank Huntington Kulp
Clarence Thomas Lansing
Fred Pierson Leigh
Alma Van Peyma Lloyd
John Luke Maxwell
Floyd Eugene Metcalf
Charlie Orland Middleton
Clarence George Morsheimer
Margaret Anna Monroe
William Arthur Myers
Everett Ray Neff
Ferris David North
Harry Warford Ogden
Charles Andrew Pankow
Roy Clinton Parker
John Harmon Parmele
Foster Samuel Post
Roy Wilbur Reid
Frank Augustus Rheubottom
Frank Elmer Rians
J. G. Roberts
Roy George Roberts
Walter Mark Rooks
Alexander Ross
Adolphus Augustus Rounds
Oscar Garfield Ryerse
George Albert St. John
Frederick James Shaddock
Orin Merrill Skinner
William Alexander Smith
Charles Conrad Steigerwald
Amos George Stiker
Laverne Coleman Swain
Walter Edward Thomas
Clarence Thorn Van Woert
Clarence Adna Warner
Walter Ambrose Warren
James Edward Watson
Harold Parker Wells
Charles William Wise
William Elphiston Wray

UNITED STATES PATENTS.

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING APRIL 1905.

April 4.

No. 786,279, to GEORGE P. FRANKLIN. Apparatus for making dentures.

No. 786,662, to JOHN E. MORGAN. Dental engine attachment.

No. 786,678, to CLIFTON M. RAWLINS. Dental floss holder.

No. 786,748, to BENSON W. FORDYCE. Artificial denture.

April 18.

No. 787,350, to WILLIAM B. ALFORD and EDWIN P. ALFORD. Shaft attachment for dental motors.

No. 787,352, to COLIN T. CAMPBELL. Artificial teeth.

No. 787,584, to ARTHUR E. MATTESON. Dental furnace.

No. 787,826, to GEORGE L. BRUCE. Dental flask.

No. 787,861, to WILLARD B. SHELP. Apparatus for straightening teeth.

April 25.

No. 787,937, to FREDERICK L. NORTON. Operative dental instrument.

No. 787,947, to RODERICK M. SANGER. Dental pliers for shaping clasps and half-collar crowns.

No. 787,981, to WILLIAM F. GREEN. Dental disk shield.

No. 788,490, to CARL L. NELSON. Apparatus for swaging dental plates.

THE

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ORIGINAL COMMUNICATIONS.

TARTAR UPON THE ROOTS OF TEETH: ITS FORMATION AND REMOVAL.

By EDWARD C. KIRK, D.D.S., Sc.D., Philadelphia, Pa.

(Read before the Georgia State Dental Society, Atlanta, Ga., May 4, 1905.)

THE study of the causes leading to the deposit of calcareous concretions upon human teeth is one which is so extensive in its scope and involves such complex factors that it would be impossible in the brief time at our disposal to even touch upon them all. Indeed, the question under consideration, as I view it, is but a specialized department of that wider general problem of the formation of similar deposits in other of the bodily structures, and the study of the common factors in their formation would lead us so far afield in the domain of physiology and physiological and pathological chemistry that it would require much larger limits than those of a single essay to adequately present the details of the problem.

In the practice of dentistry we have come to definitely recognize two distinct varieties or classes of calcareous concretions upon the teeth. First, those which are found upon the exposed portions of the tooth-crowns and in situations which, together with other considerations, have led to the generally held conclusion that they are salivary in origin. Second, a variety of deposit differing in characteristics from the salivary concretion, and found upon the roots of teeth; this has been called sanguinary tartar or serumal tartar, from the belief that it was not derived from the saliva but directly from the blood or blood plasma. It is interesting to note in this connection that attention was first called to the blood origin of this variety of deposit by Dr. J. H. P. Brown in a paper entitled "Inflammation of the Gums," which was read before this society at its annual meeting in 1870 and published in the *American Journal of Dental Science* of the same year (vol. iv, page 241).

Dr. Brown said as to this variety: "The tartar that is deposited deeply down toward the apex of the root is no salivary deposit at all, but a formation or precipitate from the secretion thrown out by the diseased gums. This tartar has a dark greenish appearance, sometimes tinged with yellow, and presents a nodular formation. It has altogether a different appearance from salivary calculus."

More than a decade later Dr. L. C. Ingersoll of Keokuk, Iowa, writing upon the same topic, adopted practically the same view as to the origin of these deposits which he called sanguinary calculus, and in his paper published in the *Ohio State Dental Journal* (vol. i, 1881, page 189), says: "Sanguinary calculus is one of the results of inflammatory action and not a cause, while on the other hand salivary calculus is a cause of inflammation and not a result."

The observations of both of these writers, as here quoted, are interesting not only as suggesting the direction in which the mode of origin of these deposits might be intelligently sought, but because they were the first, so far as I am aware, to differentiate between the salivary concretions and those found upon tooth-roots. Concretions upon the roots of teeth had of course been observed by dental practitioners and others from the earliest recorded studies of the teeth, but no distinction, so far as I am aware, had been made as to the difference in origin of the two classes until the publication of Dr. Brown's paper already quoted.

In 1886 Dr. G. V. Black, adopting the sanguinary origin of these root concretions, called them "serumal calculus," and the designations of Ingersoll and of Black have been generally adopted by the profession.

During the past decade some discussion has arisen with reference to the etiology of these root concretions, and by a few observers their asserted origin from the blood has been pointedly questioned on the ground that it had not been conclusively shown in any case that saliva was excluded as a possible factor in their formation. This was the view maintained by the late Prof. W. C. Barrett. Additional interest was aroused in the question of the causation of these root concretions by the announcement of the "uric acid" theory of Prof. C. N. Peirce as offering an explanation of the etiology of so-called pyorrhea alveolaris, and his division of the disorders destructive of the retentive structures of the teeth accompanied by calcareous deposits into two classes, namely, ptyalo-calcic and hemato-calcic pericementitis.

The doubt raised by Dr. Barrett and others as to the sanguinary or hematic origin of these root concretions, and the exclusion of the saliva as a possible factor in their formation, is important, for notwithstanding the fact that we have many analogous instances of the formation of calcareous concretions in tissues, or under conditions where saliva is not a possible factor in their production, and, while it is quite easy upon the grounds of analogy and of physiological chemistry to explain the mode of formation of root concretions without reference to the influence of the saliva, nevertheless it is desirable, as a matter of scientific fact, that this element of doubt should be eliminated, and, if there are cases in which root concretions are formed without access of saliva, that we should know it.

So far as my own observations are concerned I have satisfied myself beyond all reasonable doubt that calcareous deposits do form upon the roots of teeth in instances where the saliva is absolutely excluded as a possible factor. I have extracted a number of teeth in which careful exploration showed no break whatever in the gingival attachment, and yet a calcareous deposit was found upon the root. I have, however, noted a distinct difference in the character of the deposit in all cases where the gingival attachment was unbroken as compared with those cases in which the attachment of the gum and pericementum was destroyed, as in the case of a pyorrheal pocket. In the former instance the deposit was at the apex or near it, and was more nodular and less firmly adherent than in the latter. I have never observed any case of calcareous deposit upon a root with unbroken gingival attachment in which there was not positive evidence of existing or previous suppurative inflammation about the root. The deposits described by Dr. Brown in his paper before this society in 1870, and the serumal deposits of G. V. Black, appear to be those which are associated with pyorrheal pockets, and no opinion is advanced by either of these observers as to whether the original seat

of the inflammatory action was high up on the root or at the gingival margin, and associated with progressive destruction of the pericemental attachment in the direction of the root apex or toward the gingivæ, as the case may be.

It is my belief that we have to consider two classes of calcareous deposits, both of them products of inflammatory action in the pericementum, the deposits differing in location and physical characteristics according as they are associated with a superficial or a deep infection of the peridental membrane. Clinical observation has taught us that there are at least two types of infection of the peridental membrane resulting in pus formation, calcareous deposits upon the roots, eventual destruction of the retentive apparatus of the tooth, and finally, loss of the tooth from non-support. The first is ulcerative in type; the invasion of the peridental membrane by destructive bacteria is superficial; the attachments of the tooth undergo necrosis layer by layer, the inflammatory action proceeds from the gingiva toward the root-apex, and the root is more or less covered with a thin, dense, greenish, brownish or yellowish film of tartar which is extremely adherent. The second type is characterized by a deep-seated inflammation which may occur upon any part of the root, without break in the gingival attachment, and comprises that variety of suppurative process in the peridental membrane known clinically as an abscess upon a tooth with a living pulp. This type of suppurative inflammation is also accompanied by the deposition of a calcareous concretion on the root in those instances where resolution of an acute inflammation has occurred without evacuation of the contents of the pus cavity. The calcareous deposit in these cases resulting from old abscesses upon teeth with living pulps is more nodular in character and only slightly, if at all, adherent to the cementum; the deposit seems to be situated within the peridental membrane and not upon the cementum. The explanation for the loosely adherent character of this type of deposit is, I think, to be found in the fact that abscesses upon the roots of teeth with living pulps, in so far as I have studied them, are within the structure of the peridental membrane, not beneath it as in the case of infections of the peridental membrane through the pulp-canal following infection and putrefaction of the pulp. That is to say, they are *intra* pericemental and not *sub* pericemental, hence at least in the early stages of their formation the intervening layer of peridental membrane prevents their firm attachment to the crusta petrosa of the root.

The common factor in both types of deposit is their formation in association with an inflammatory exudate, and it is in recognition of this factor that they have received the designations which indicate the blood plasma as the fluid which has furnished the material of which they are formed.

Various analyses of tartar deposits have shown them to contain calcium and magnesium phosphates and carbonates, also the ammonio-magnesium phosphate known as "triple phosphate," in combination with organic matter. Microscopic examination has revealed the presence of spherical bodies analogous in appearance and form to calco-spherites, which facts contain some interesting suggestions as to the chemistry of the formation of this peculiar material which we call serumal tartar.

Mr. W. H. Pepys, Jr., the famous English chemist, as early as 1803 in a note on the analysis of tooth-structure published in the first edition of Fox's "Natural History of the Human Teeth," called attention to the extreme solubility of calcium phosphate, and said, "The great solubility of the phosphate of lime in even the weakest acids is very extraordinary. Phosphate of lime mechanically suspended in water is speedily and completely dissolved by passing a copious stream of carbonic acid gas through it."

The fact that calcium carbonate is soluble as calcium bicarbonate in water impregnated with carbonic acid has long been known in connection with the mode of stalactitic formations in caves and elsewhere, and that fact has been brought forward to help explain the mode of

formation of tartar; but as tartar consists essentially of earthy phosphates with only a small percentage of carbonates, the fact brought out by the observation quoted from Mr. Pepys is a necessary factor in the theory that carbonic acid is the original solvent of the phosphates of which tartar is composed.

Recent observation has tended to confirm the opinion of some earlier writers, Liebig for example, that the carbonic acid in the blood plasma was an important factor in holding the earthy phosphates in solution. This view is particularly interesting in view of the observations reported by Dr. Shearer of London in the *Lancet* of February last, with reference to the high carbonic acid content of the blood plasma in arthritics; for it is in this class of individuals particularly, that we most commonly find calcareous concretions of the serumal variety upon tooth-roots.

The extremely weak nature of the chemical affinity between carbonic acid and the earthy phosphates permits of its ready decomposition from a variety of causes, leading to the precipitation of the basic phosphates as a calcareous mass. With these data in mind it is not difficult to understand how when the blood plasma, holding lightly in solution by virtue of its contained carbonic acid a quantity of calcium salts, is poured into an inflammatory area containing substances capable of liberating the carbonic acid from its association with the earthy phosphates, that this result should occur. It is well known that pus is more highly alkaline than the blood plasma; also that when putrefactive changes are actively progressing through the agency of certain bacteria not only is an alkaline reaction a constant factor but that ammonia is one of the end products of such action. Either the increased alkalinity of pus formation or the presence of ammonia as an end product of putrefaction would result in the precipitation of earthy phosphates from the blood plasma, poured into an area where such chemical changes were taking place.

But tartar formation involves something more than mere precipitation of earthy phosphates. It includes the chemical and physical modification which the precipitated earthy salts undergo by combination with a colloidal element. This latter element is furnished by the mucin of the saliva, the albuminous constituent of the blood plasma, or the protoplasmic matters entering as a constituent of pus. It is the organic colloidal component of tartar, and especially of the serumal variety, which gives density and adhesiveness to the masses with which we have to deal in the treatment of pyorrheal cases.

I do not purpose taxing your patience further by a critical examination of the way in which the precipitation of earthy salts is modified when it occurs in contact with colloidal substances, but simply refer you to the literature of that subject, especially to the original observations of Mr. Rainie of London, whose treatise "On the Mode of Formation of the Shells of Animals, of Bone and of Several Structures," published in 1858, was the first scientific study of this subject. The papers by Prof. Harting of Utrecht, 1872, and Dr. Ord, 1879, are important in this connection. Among dental writers on this subject first place should be given to Dr. R. R. Andrews of Cambridge, Mass., for his studies relating to the calcification of enamel and the other hard structures of the teeth. Dr. J. Leon Williams of London has likewise contributed largely to our knowledge of this subject, and as the principles involved in calcification are fundamentally analogous to tartar formation in so far as both involve the combination of calcium phosphate with a colloid material, those interested in the chemico-vital aspect of the question of tartar formation should familiarize themselves with the calcification process as a preparatory help to the understanding of tartar formation.

To summarize thus far, I should say, first, that I believe there is a form of tartar derived from other sources than the saliva as stated by Dr. Brown, and that I regard the division of tartar formation as suggested by Peirce, into two groups, salivary and hematic, as correct. Second, I agree with the position of Dr.

Ingersoll that so-called serumal tartar is primarily a result of inflammation and not a cause thereof, excepting in so far as it may become a predisposing cause in the same manner that other mechanical irritants may be predisposing causes of inflammation. Third, I am of the opinion that serumal tartar, as well as tartar of any description, has chemical analogies to calco-globulin, for the reason that analysis and microscopic study show it to be composed of earthy salts in combination with colloidal organic material.

REMOVAL OF TARTAR.

And now a few words as to its removal. From a practical standpoint we are restricted to two modes of attack on these annoying deposits; that is, either by chemical solvent means or by instrumentation, or a combination of both of these.

It has been found difficult and indeed impossible to effectually remove serumal deposits by means of solvents, yet I feel satisfied that these are not without value when intelligently selected and applied. Of course acids are the only class of agents having sufficient solvent action on tartar deposits to be practically available; alkalies in such strength as to have appreciable action would not be without destructive effect on the soft tissues. Acids differ in their disintegrating and solvent effects upon tartar, and they should be selected with reference to their applicability to the purpose in question.

Doubtless sulfuric acid properly diluted has been most generally used for this purpose, yet experiments seem to indicate that lactic acid as suggested by Dr. W. J. Younger has certain advantages not possessed by sulfuric acid; lactic acid is less escharotic in proper dilution, and it has the decided advantage of directly dissolving the calcareous salts without chemically decomposing them and forming insoluble compounds, whereas sulfuric acid decomposes the calcium phosphate, forming calcium sulphate, or plaster of Paris, which is practically insoluble.

Trichloracetic acid is valuable as a solvent; it acts also as a coagulator of the surface of the adjacent soft tissues and thus helps to maintain a fairly dry field of operation. Its coagulating property is not without a certain disadvantage, however, for the reason that it tends to harden the organic matrix of the tartar.

Acids can only be regarded as adjuvants to instrumentation, they cannot be depended upon alone to completely remove the deposit.

The mechanical factors involved in the removal of serumal deposits from tooth-roots are often such as to render the perfect performance of the operation extremely difficult and oftentimes well-nigh impossible. Experience has demonstrated that unless the operation be so performed as to absolutely remove these deposits from the cementum, all attempts at curing the pyorrheal condition are futile. The slightest remaining deposit acts as an irritant to the adjacent living tissue and maintains the conditions which invite bacterial invasion. Therefore, the complete removal of the calcareous deposits is a prerequisite to successful therapeutic treatment in pyorrheal cases. The mechanical difficulties which confront the operator in the more obstinate cases are the restrictions of the field of operation and the density and adhesive tenacity of the deposit.

The operation must often be done unaided by vision, in a deep narrow pocket with walls of inelastic gum tissue and upon a deposit dense, more or less smooth and enamel-like, which is tenaciously adherent to the cementum. The deposit may be nodular or granular in character, presenting an irregularity of surface readily recognizable through the educated tactile sense of the operator by means of the impression received from contact of the deposit with the instrument. Or, the deposit may be dense, thin, and smooth, in which case the difficulty of its recognition by tactile impression is greatly enhanced, for unless the operator has had, and indeed is having, constant training by experience in the instrumental detection of these deposits, he may readily mistake the superficial smoothness of some of them for the smoothness of the cementum itself.

The mechanical limitations imposed by the restricted field of operations in the pyorrheal pockets necessitates the use of instruments especially designed to reach and remove these serumal deposits, and much ingenuity has been displayed in the devising of instrument forms which may be efficiently used for that purpose. In order to reach the deposit when it is situated well toward the root-apex, the shank of the instrument must be narrow and thin, otherwise it will not enter the pocket or reach its entire depth without injury to the soft tissues which in part form its walls. The slenderness of the shank of this class of instruments renders it necessary that they shall be of elastic temper, for if tempered hard enough to be rigid they would fracture under the lateral pressure required to break up the attachment of the deposit. But this feature of elasticity in the instrument shank is often undesirable, for many of the thin enamel-like deposits of serumal tartar are so dense in character and so strongly adherent to the cementum that sufficient pressure cannot be brought to bear upon the cutting edge of a thin, elastic instrument to cause it to penetrate the mass, hence resort must be had to a scraping or planing movement of the instrument with a view to removing the deposit layer by layer. Another mechanical difficulty with which we have to contend in this operation is that we are as a rule restricted either to a push or a pull cut in the effort to dislodge the calcareous mass. In either event the resistance of the whole body of the deposit is opposed at one time to the blade of the instrument, and we all know how difficult it is to dislodge any considerable mass of the deposit in that way, especially with a thin-bladed and delicately formed instrument having a spring-tempered shank. Where the effort is made to remove the deposit by a scraping or planing action of the instrument, it frequently happens that the operator is misled by the smoothness of the resulting surface of tartar into the belief that he has removed all of the deposit when he has only smoothed and thinned it down by scraping off the inequalities of its original surface, leaving the root still covered with a thin tartar deposit from neck to apex. I have had opportunity to examine root-surfaces where this mistake has been made by conscientious and skilful operators. The ability to distinguish between a surface of hard serumal tartar so smoothed down and the surface of the cementum merely by tactile impression through an instrument, is a refinement of skill that probably but few possess, and failure to detect the difference referred to therefore frequently happens.

A study of the conditions which I have here enumerated, and the desire to arrive at some means whereby the removal of these refractory deposits could be more certainly and effectually accomplished, has led me to construct a new type of scaling instrument which I find to be very satisfactory and which I shall endeavor to describe. Briefly stated, the principle involved in the construction of this new type of scaler is that of the cabinetmaker's toothed plane. The toothed plane is a tool used by cabinetmakers, and to some extent by carpenters, for removing old paint and varnish from wood surfaces. The characteristic feature of the tool is its "iron" or cutter, which instead of having a regular, sharp, chisel-like cutting edge, is dentated or toothed. The toothed edge is produced by the device of cutting long narrow grooves in the anterior surface of the plane iron and opposite to the bevel of the edge. The bevel intersects these grooves at an acute angle, with the result that the working edge is given a tooth-like or serrated form, this form being maintained by the repeated sharpening of the tool. The action of a tooth plane when applied to an old painted or varnished surface is to disintegrate it, breaking the hardened paint up into small particles which renders its removal quite easy when followed by an ordinary smoothing plane or by sandpaper or other surfacing device. In a similar manner the scaling instrument involving the same principle is made by cutting a regular series of grooves in the long axis of the instrument at right angles to its cutting edge and beveling the edge toward the

groove side so that the edge becomes toothed by the intersection of the grooves and the cutting edge.

The toothed or dentate edge can thus be applied to any form of root-scaler as may be desired. The efficiency of the instrument is greatly increased by this arrangement and its working capacity is enhanced in several important particulars. It acts by breaking up the deposit into small particles, disintegrating it so that its removal is accomplished with much less force and greater certainty than with an instrument having a continuous edge and used for the same purpose. This action of the toothed instrument will be readily appreciated when it

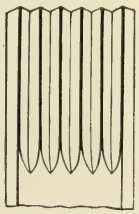


Diagram of dentate scaler.

is remembered that each tooth of the cutting edge enters the calcareous mass as a single wedge-shaped point, and as the instrument is pushed or pulled a series of channels or grooves is cut through the mass, causing it to break into small fragments which are loosened from their attachment to the cementum. Another advantage is that the dentate edge effectually prevents lateral slipping and wounding of the soft tissues by the edge of the instrument, an accident liable to happen even in skilled hands where a smooth-edged root-scaler is being used to remove a tenacious and dense deposit deeply situated on a convex root-surface. The dentate scaler not only holds its place against lateral slipping but cuts and follows its own pathway in the direction of the vertical axis of the root, disintegrating and removing the deposits as it proceeds.

The only novelty about the device is the application to this class of operative instruments of an old and well-tried principle. The same principle is successfully employed in the dentate enamel bur, the spiral osteotome of Cryer, the toothed plane, the gang chisel for dressing burstones, the dentate chisel of the stonemason, the toothed wheel for resurfacing emery wheels, and many other devices of a similar character.

It is not intended that the dentate scaler shall supplant or do away with the ordinary forms of scaler, but rather that it shall supplement the smooth-edged forms of this instrument. The dentate scaler is offered as a means for disintegrating and detaching refractory deposits on the roots of teeth; its use should be followed by a smooth-edged instrument to make the cemental surface as smooth as possible, in order to avoid all subsequent mechanical irritation of the adjacent soft parts. This final smoothing of the cementum the dentate instrument will not do. In order that its character and use may be recognized as distinct and different from the ordinary root scaler, I have been tempted to designate it as a *calcitrite*, which would specifically indicate the purpose for which it was devised, but as I have an antipathy to the coining of new words or of adding unnecessarily to our already voluminous nomenclature, I shall content myself with designating this addition to our armamentarium as a dentate scaler, and as such I commend it to your thoughtful consideration.

THE CEMENT PROBLEM IN INLAY WORK.

By GEORGE C. POUNDSTONE, D.D.S., Chicago, Ill.

(Read before Section VII, Fourth International Dental Congress, St. Louis, Mo., August 31, 1904.)

NO branch of modern dentistry occupies a more prominent position than that concerning the inlay. For esthetic reasons nothing can compare with an accurately shaped and shaded porcelain inlay. Great claims are made for it on account of its compatibility to tooth-structure, its resistance to thermal changes, and its tooth-saving qualities.

The dental profession has heard almost without number papers and discussions upon inlays. High-fusing and low-fusing bodies have been discussed with such fervor that lifelong friendships have been all but broken. The burnished matrix and the swaging process have been discussed again and again; but the one vital point has been almost overlooked, that is, the *cement*.

In almost every paper upon the subject of inlays we have heard the statement that the inlay has come to stay; but just therein lies the great drawback, —it will not stay, in many cavities.

Most dentists can with care and perseverance make a perfect inlay, exact in its shape and beautiful in its shading, but what does that signify if after a week, a month, or even a year, we find this work of art—if we can find it at all—hidden away within some vase among the other valuable family porcelains and jewels, or lying quietly in the corner of a pill-box in some upper bureau drawer.

To keep the inlay in position in the cavity without spoiling its original beauty is the problem before us. What cement to use is the question. Some cements will not stick, others wash out, others expand, so that what at first appeared to be a perfect joint is after a day or two a broad line of cement, while still others are permeated by the fluids of the mouth, micro-organisms, and débris, giving the inlay the appearance of being several shades darker than the tooth.

Until we can procure better cements, the inlay cannot reach the high degree of perfection hoped for it, and it is with that end in view that the work now presented to you has been undertaken.

What are the requisite qualities of an inlay cement?

(1) It must be capable of being compressed into a very thin film; at least as thin as the matrix used.

(2) It must have extra-adhesive qualities.

(3) It must neither expand nor contract.

(4) It must be impervious to moisture.

In giving the results of my observations and experiments the different cements will be designated by letters rather than by their commercial names, as it is not my purpose to in any way injure the reputation of any of the cements tested, nor have I an object in recommending any particular brand.

I realize that this course may be open to criticism from the fact that many dentists are waiting for somebody to tell them just what to use, but since none of the cements that I have tested are perfect and many of them have defects that I believe can be remedied, I deem it advisable to give the manufacturer one chance at least to improve upon his product.

The first series of observations was made for the purpose of determining the general appearance of the various powders, the shapes and sizes of the granules, and their relative proportions in

the mass. Microscopic slides were made from the different powders mixed with glycerin; the glycerin being used instead of the cement liquid to avoid chemical action. These slides were then studied with the binocular microscope, and drawings of carefully selected fields—that all the characteristics of the powder might be shown in one drawing—were made by the aid of the camera lucida. Lantern slides were then made from the drawings. Micrographs were made, but they were not as satisfactory as the drawings, on account of the thickness of the films, in some cases exceeding 1/500 of an inch. Measurements were made with the micrometer.

Cement A, in glycerin. Large granules: few in number; from 25 to 35 microns in diameter; irregular in shape.

Medium granules make up the bulk of the powder; from 8 to 15 microns in diameter.

Fine powder: small amount.

Cement B, in glycerin. Large granules: few in number; from 30 to 50 microns in diameter. Some of these appear to be zinc oxid, while others are flat, transparent crystals.

Medium granules: few in number; from 10 to 15 microns in diameter. They resemble the large ones.

Fine powder: The bulk of the powder is made up of small granules from 2 to 5 microns in diameter and of small rod-like prisms, transparent, and square at the ends, from 2 to 5 microns in diameter and in length 3 to 50 microns.

There are in this powder a few bright red granules of medium size.

Cement C, in glycerin. There are two distinctly different kinds of granules in this powder, in all the different sizes. The somewhat regular shaped yellowish granules, apparently of zinc oxid, and a transparent, generally square crystal form.

Large granules: few in number; from 25 to 30 microns in diameter.

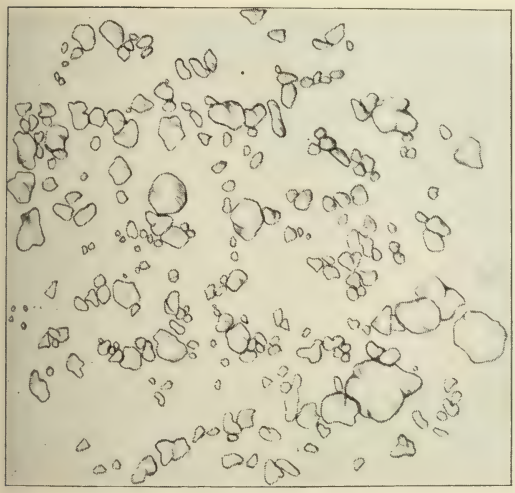
Large crystals: few in number; from 40 to 50 microns in diameter.

Medium granules: many; from 7 to 15 microns in diameter.

Fine powder: rather small in amount; made up of both granules and crystals.

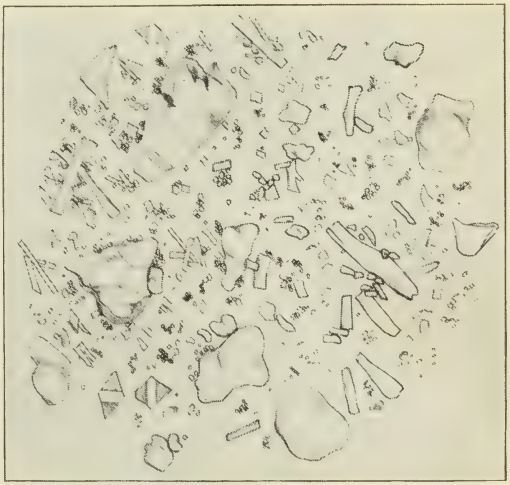
Cement D, in glycerin. Large granules: very few in number; from 30 to 45 microns in diameter, with an occasional

FIG. 1.



A, in glycerin.

FIG. 2.



B, in glycerin.

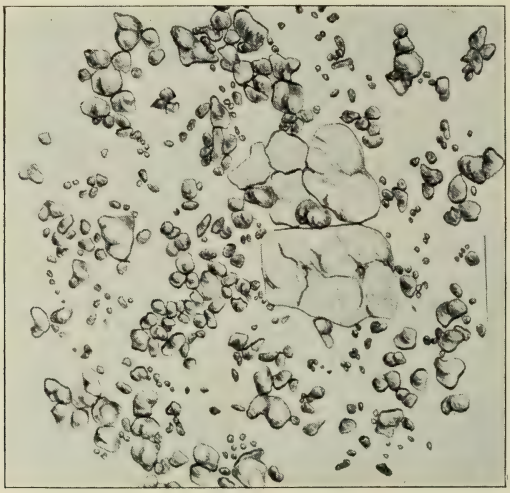
one as high as 56 microns. Very irregular in shape.

Medium granules: few in number; from 12 to 18 microns in diameter.

microns in diameter, with an occasional scale-like, semi-transparent flake as high as 50 microns.

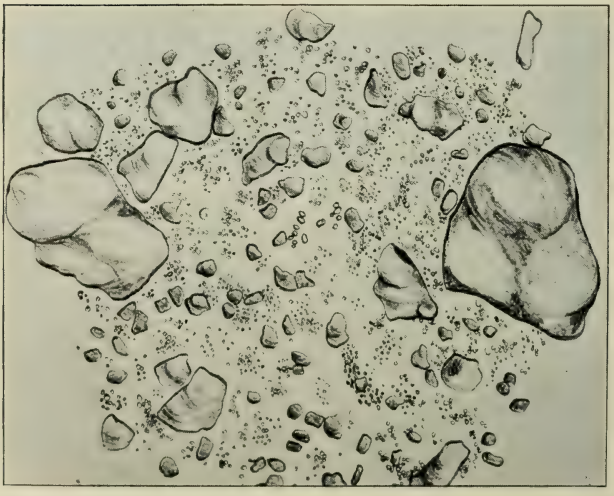
Medium granules make up the bulk of

Fig. 3.



C, in glycerin.

Fig. 4.



D, in glycerin.

Fine powder: extremely fine and flour-like; of uniformly oval granules less than 2 microns in diameter; form the large proportion of the powder.

Cement E, in glycerin. Large granules: very few in number; from 20 to 25

the powder; from 10 to 15 microns in diameter.

Fine powder: small amount.

Cement F, in glycerin. Large granules: few in number; from 30 to 40 microns in diameter, with an occasional

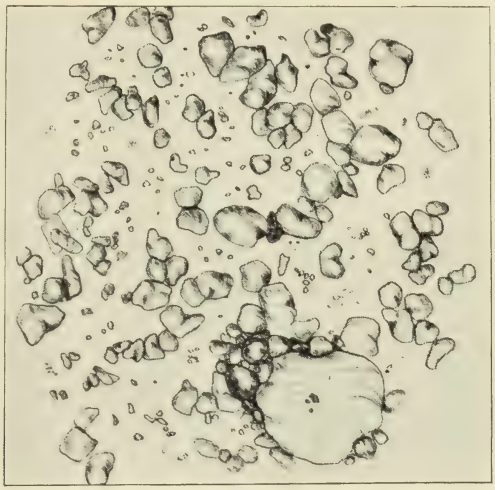
flat one as high as 56 microns; very irregular in shape.

Medium granules make up the bulk of the powder; from 16 to 30 microns in diameter.

Medium granules: many; from 18 to 22 microns in diameter; more regular in form.

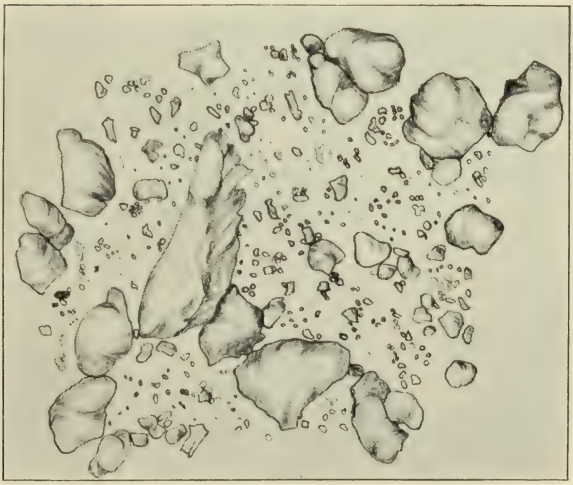
Fine powder: a large amount, with particles irregular in form.

FIG. 5.



E, in glycerin.

FIG. 6.



F, in glycerin.

Fine powder: large amount; very fine; granules uniform in sizes and shape.

Cement G, in glycerin. Large granules: few in number; from 35 to 46 microns in diameter; irregular in shape.

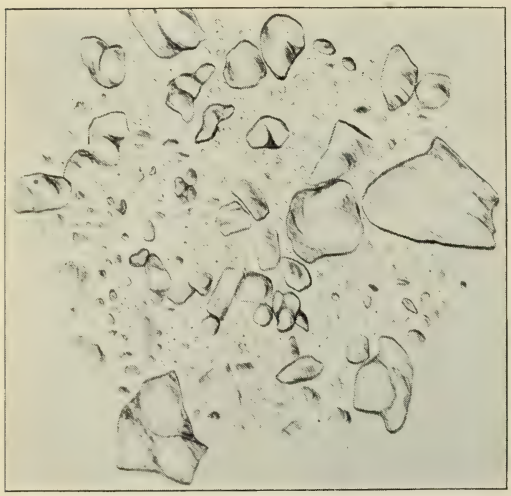
Cement H, in glycerin. Large granules—of three varieties. Granules of zinc oxid (apparently) very few; from 25 to 40 microns in diameter. A few semi-transparent crystals, irregular in

form, from 50 to 60 microns in diameter; and many transparent broken crystals of all shapes and sizes up to 60 microns in diameter.

Medium granules: few in number; microns in diameter; oval in shape with smooth rounded edges.

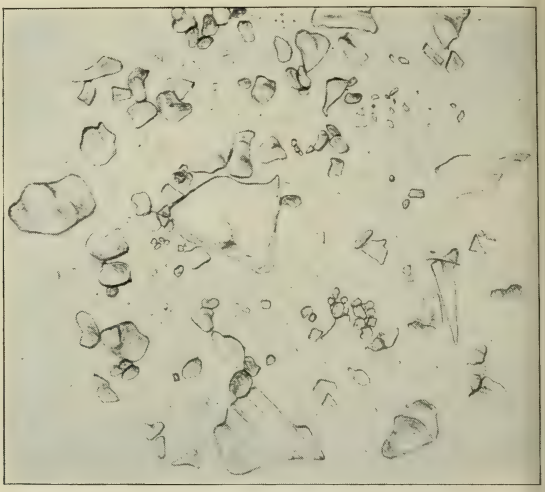
Medium granules make up the bulk of the powder; from 10 to 15 microns in diameter; oval in form.

Fig. 7.



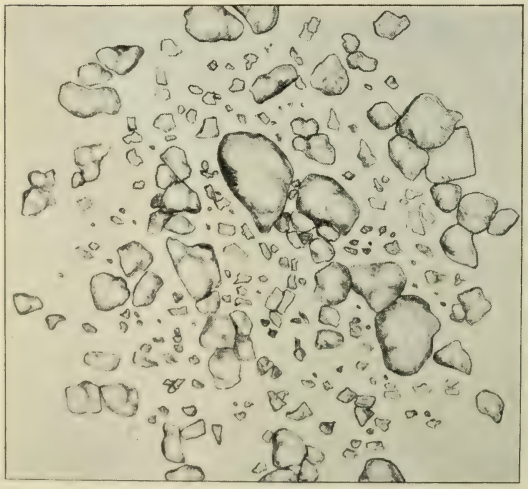
G, in glycerin.

Fig. 8.



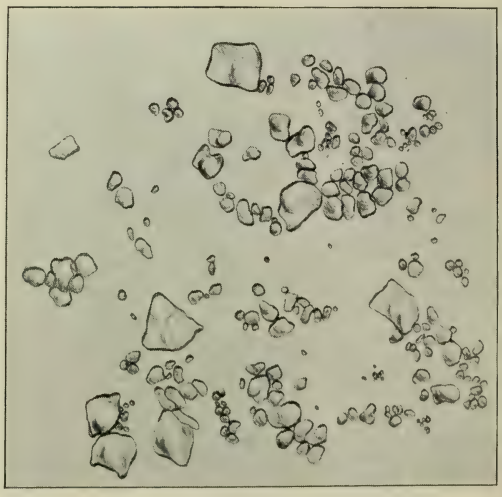
H, in glycerin.

Fig. 9.



I, in glycerin.

Fig. 10.



J, in glycerin.

from 5 to 20 microns in diameter, and many broken crystals of medium size.

Fine powder: small in amount, resembling the larger granules and crystals.

Cement I, in glycerin. Large granules: very few in number; from 20 to 27

Fine powder: small in amount; very fine.

Cement J, in glycerin. Large granules: very few; from 20 to 25 microns in diameter.

Medium granules: very many; quite

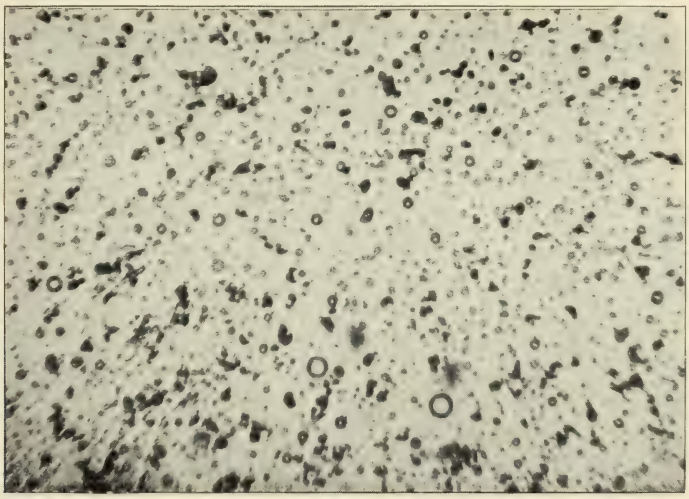
regular in form; from 8 to 15 microns in diameter.

Fine powder: a comparatively large amount of uniformly regular granules.

In this powder there is an occasional bright red granule.

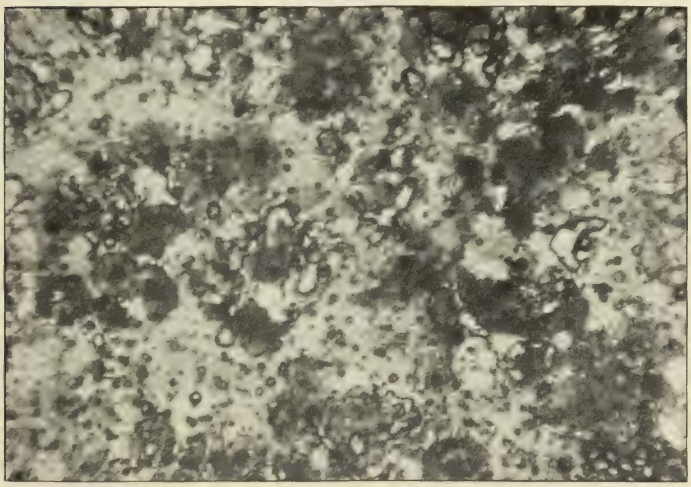
For the second series slides were made from the various powders, each mixed with its corresponding cement liquid in the manner described by the manufacturer, to a consistence suitable for setting an inlay. Cover glasses were subjected to pressure in order to get a thin film of cement. These slides were then studied with the microscope. The process of setting was carefully watched for several hours, after which the slides were examined and studied and changes noted every few hours for a week or more, or until no further change was noted.

FIG. 11.



A—one hour.

FIG. 12.

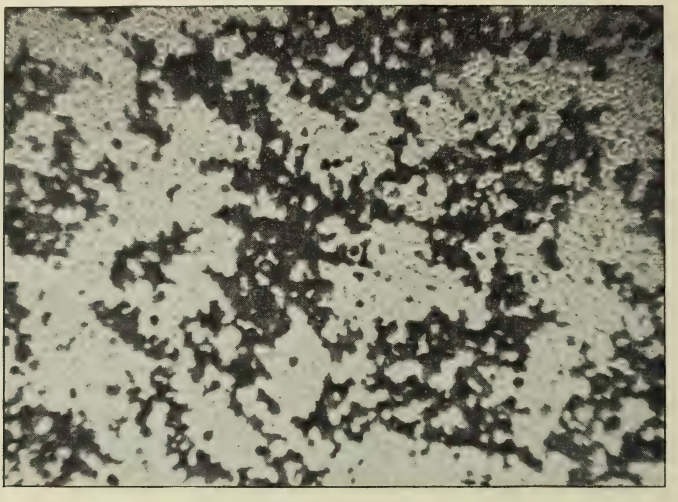


A—three days.

The important points of these observations are as follows:

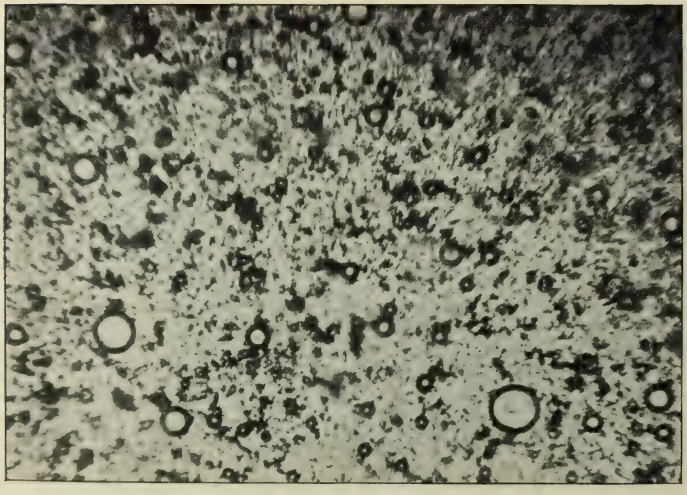
By the end of 24 hours the fine powder seems to have about all united with

Fig. 13.



A—three months.

Fig. 14.



B—one hour.

Cement A.

Almost immediately the fine powder commences to unite with the liquid, the small granules begin to disappear and give off minute bubbles which increase in size and number until at the end of an hour the field is pretty well covered with them.

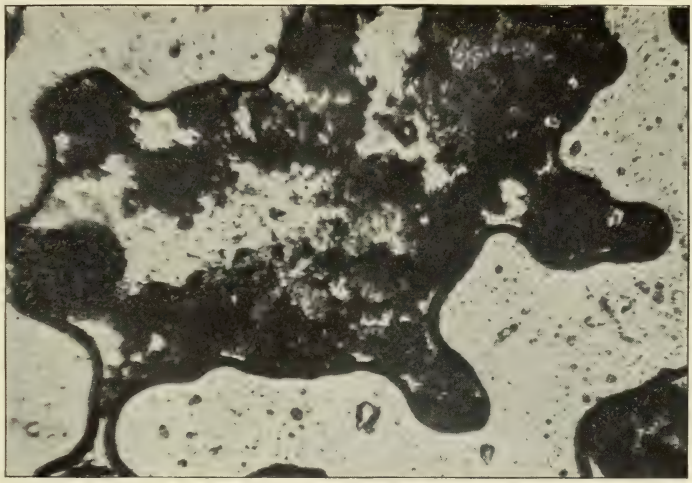
the liquid. Very little if any change has taken place in the large granules except a slight diminution in size due to the dissolving of the outer surfaces by the liquid. By this time many of the minute granules are surrounded by translucent areas which in three or four days develop into beautiful radiating crystals.

By the end of the week many of the bubbles have gone together, forming large irregular spaces, and the entire mass has taken on a grayish mottled appearance.

Cement B.

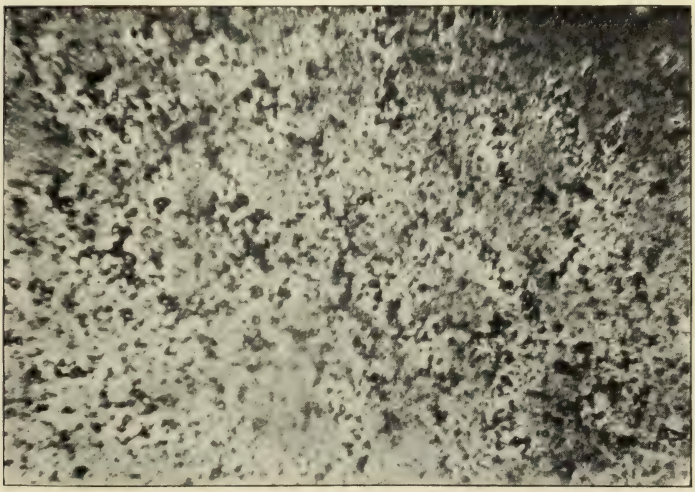
Within twenty minutes after mixing the rod-like crystals in this powder have almost disappeared. The other granules

FIG. 15.



B—twenty-four hours.

FIG. 16.



C—one hour.

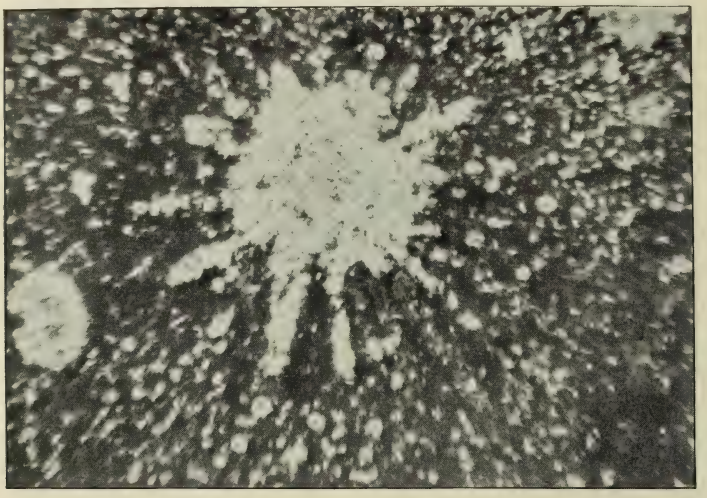
In another week some of the largest granules are still visible, the open spaces have become more irregular, and the mass is much more opaque in its appearance.

show little change. The entire slide has a mottled grayish appearance.

Quite a number of bubbles appear soon after mixing; they expand considerably

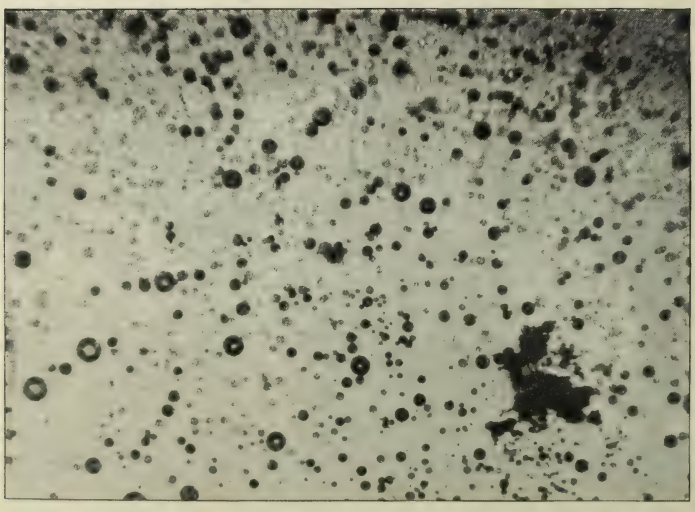
in size, and in from two to three hours a clear area forms around each bubble.

Fig. 17.



C—four weeks.

Fig. 18.



D—one hour.

Around the edges of these clear spaces crystallization is quite apparent at this time and progresses rapidly. Within five hours there are large open spaces throughout the film. Circular areas of crystallization are numerous at or near the borders of the clear spaces. By the end of 24 hours the open spaces occupy at least one-half of the slide. Crystallization seems to be completed by this time.

Cement C.

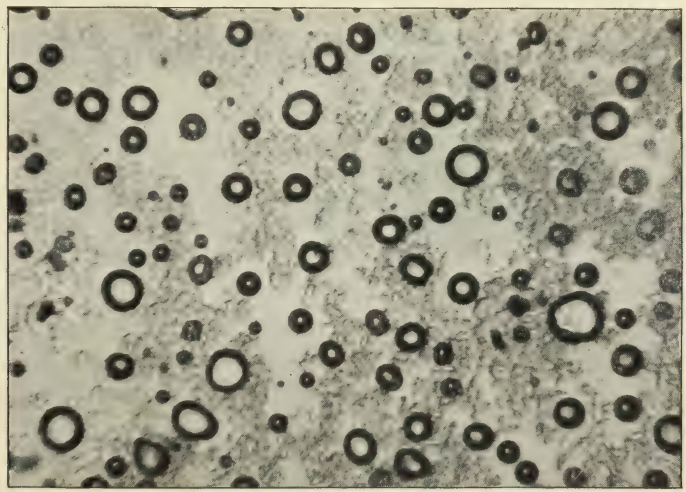
The transparent crystals of this powder dissolve readily in the cement liquid,

but the action upon the other granules is slow. Very few bubbles appear.

By the end of an hour the film has a dark grayish granular appearance, with the zinc granules still plainly visible. Subsequent change takes place very slowly in this cement. In two or three days crystallization begins at intervals over the slide, building from a center, the crystals being formed successively in the form of rays, the area very much resembling the piece of jewelry known as a sunburst.

bles for a week or ten days and then begin to assume irregular forms. By the end of the second week some crystallization is apparent around the edges of the bubbles. There is at this time little or no apparent change in the larger granules. In about four weeks the entire field becomes crystallized, the granules have almost entirely disappeared or have been covered by a mass of crystals projecting like the spines on a sea-urchin. The open spaces are also in many places fringed by crystals.

FIG. 19.



D—three days.

The outermost crystals are large with definite angles and pointed ends and are of a yellowish color. In viewing these crystallizing areas by transmitted light there is considerable iridescence.

Cement D.

Almost immediately after mixing and placing upon the slide a large number of small bubbles appear, arising from the finer particles of powder. The bubbles increase in size and number and, after a short time, unite with each other when coming into contact until they cover almost one-third of the entire field.

These remain as distinct circular bub-

Cement E.

In this cement very little change is noticed in the first ten minutes except a gradual fading away of the smaller particles of the powder in its union with the liquid. This goes on until nearly all of the fine powder has disappeared. The medium sized and large granules have a decided tendency to group themselves into clusters or chains, leaving proportionally large areas of nothing but the liquid.

The granules show the effect of the action of the liquid by their diminished size and rounded edges. A few bubbles are present when this cement is first

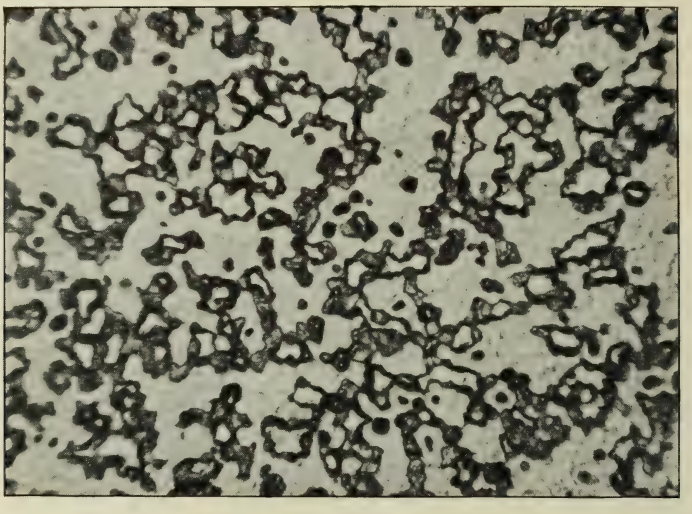
mixed, but no subsequent change takes place. They are in all probability bubbles of air incorporated with the mass in the mixing.

Cement F.

In this cement the fine powder unites readily with the liquid, within a few minutes small bubbles begin to appear, arising from the dissolving particles of the fine powder.

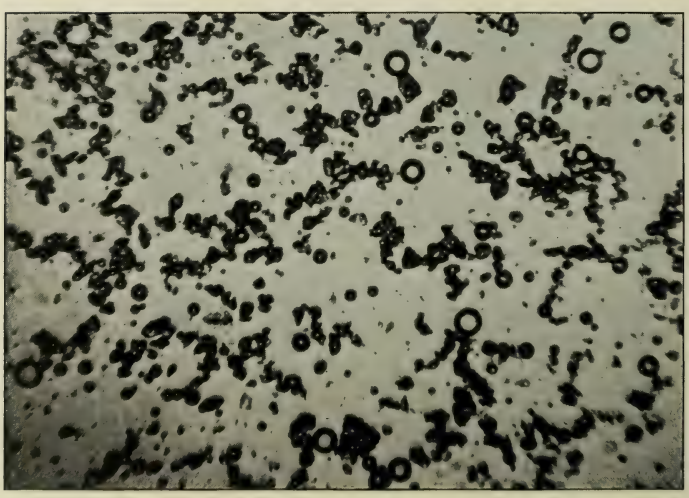
These bubbles increase in size and number for two or three days, after which there is little or no change. The me-

Fig. 20.



D—four weeks.

Fig. 21.



E—one hour.

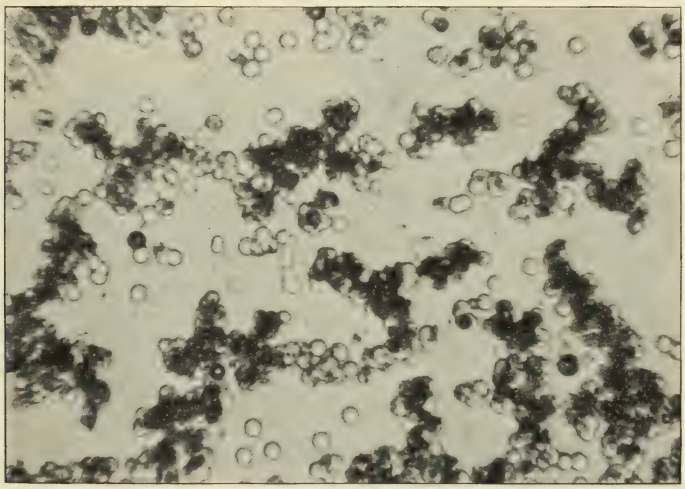
Crystallization is apparent after two or three days and continues in its formation for more than two months. The crystals are all of the needle form, radiating from a center.

dium and large sized granules seem to undergo very little change other than a slight diminution in size, the sharp jagged edges becoming smooth and rounded.

Cement G.

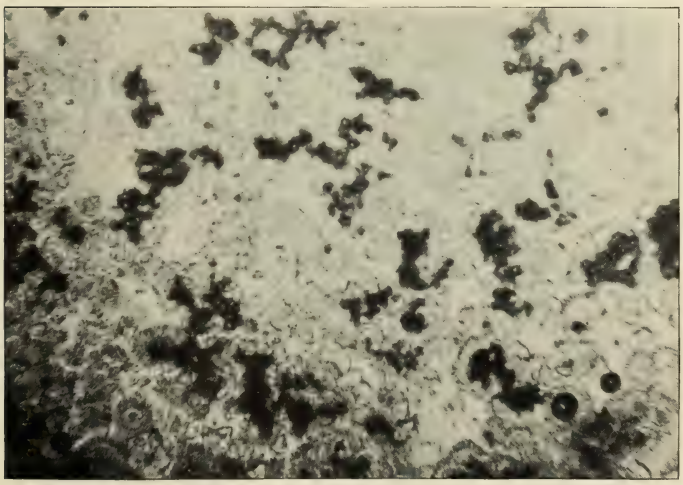
This is a rather slow-setting cement. Very little change is noticed within the first fifteen minutes except the appear-

FIG. 22.



E—four weeks.

FIG. 23.



E—three months.

Crystallization is apparent in about three or four days, but its progress is rather slow, the entire mass becoming crystallized in from four to six weeks.

ance of a few bubbles arising from the particles of fine powder. At the end of an hour nearly all of the fine powder is still visible, and after 24 hours only the finest particles have disappeared. The

small bubbles that appear at first do not increase to any extent either in size or number, but remain as bubbles in the mass.

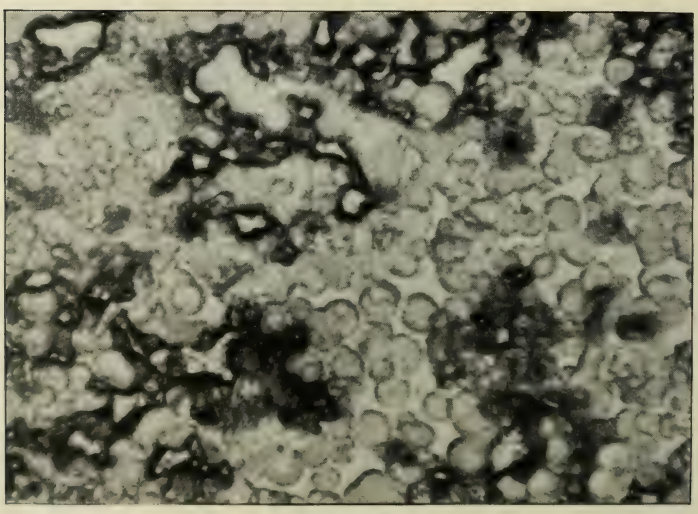
Very few of the granules or crystals of this powder seem to be readily dissolved by the liquid, for nearly all are still visible after 24 hours, though appreciably smaller. The slide at this time is of a grayish color and a few of the bubbles have commenced to assume irregular forms.

FIG. 24.



F—one hour.

FIG. 25.



F—four weeks.

Cement H.

Quite a large number of bubbles appear in this cement soon after it is mixed. They increase somewhat in size.

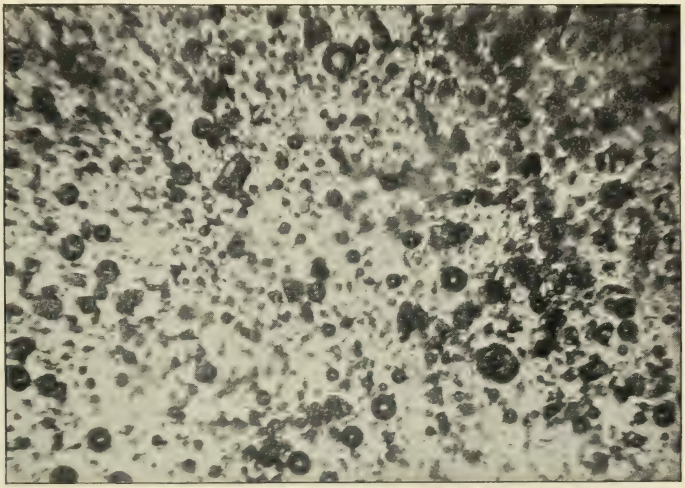
Cement I.

The fine powder of this cement unites very readily with the liquid. The larger granules have a tendency to arrange themselves into groups or chains with spaces of liquid between, as in Cement *E*.

Quite a number of bubbles appear in the clearer portions of the slide, apparently coming from the particles of fine powder. By the end of a week there is a large amount of crystallization.

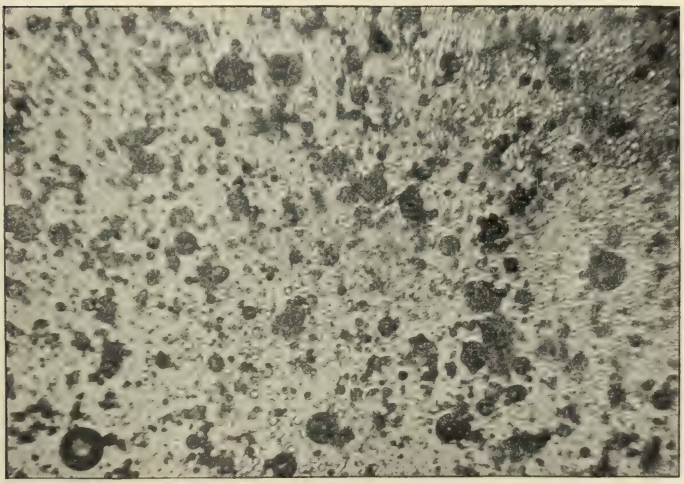
The bubbles have by this time changed into large irregular spaces and the slide has a grayish mottled appearance much the same as that noted in Cement *A*.

FIG. 26.



G—one hour.

FIG. 27.



G—two days.

Cement J.

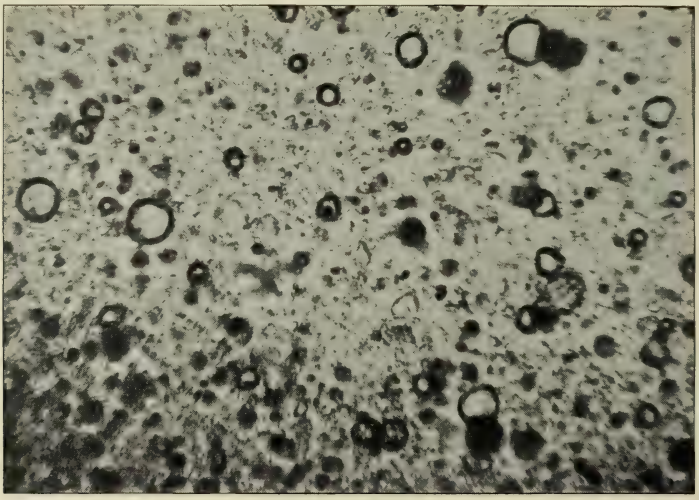
The fine powder quickly unites with the liquid and a few bubbles appear within the first half hour.

In two hours most of the granules have disappeared and crystallization has ad-

vanced to a considerable degree. Two forms of crystals or of crystallizing areas are present: a rod or prism square at the ends, and the other in the form of a rhombus with the obtuse angles rounded.

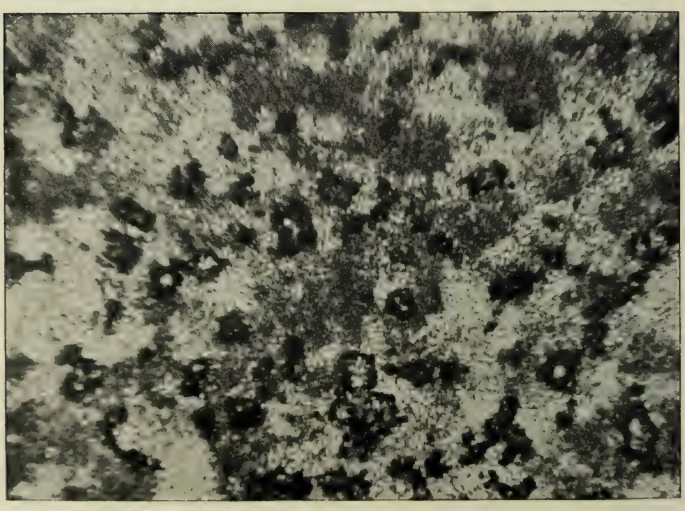
There is no definite arrangement of the crystals with respect to each other. In 24 hours there is little change except that the rounded angles of the large crystals are now straight lines, making six-sided prisms.

FIG. 28.



H—one hour.

FIG. 29.

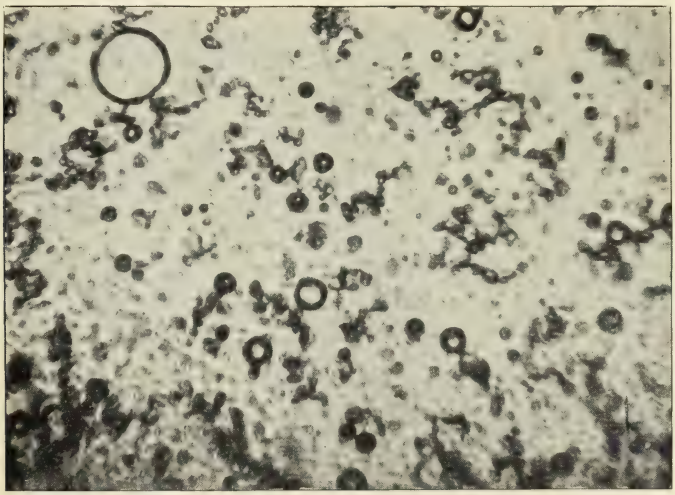


H—two days.

Slides of the different cements were made in the same way and kept in water at body temperature. They were studied from time to time with no appreciable

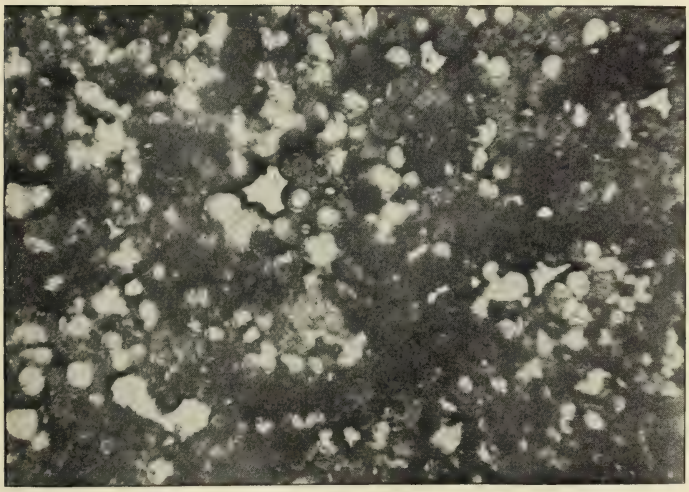
difference in the results except a possible hastening of the process of crystallization. The bubbles and open spaces formed exactly the same as when dry, and in time became filled with the water, as will be shown in the slides for penetration.

FIG. 30.



I—one hour.

FIG. 31.



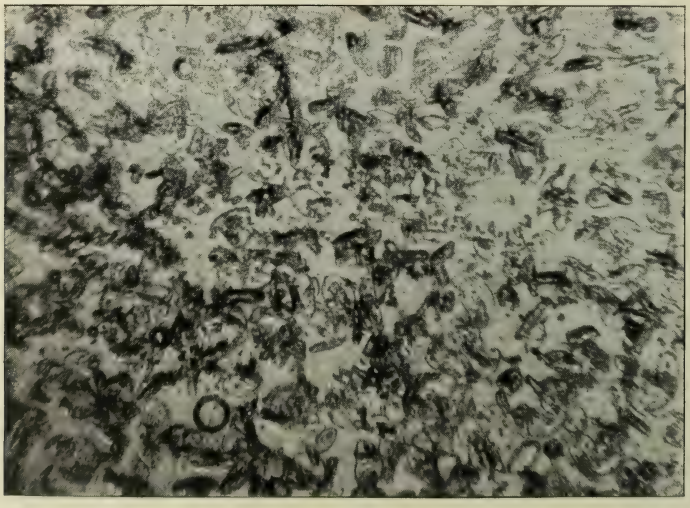
I—two days.

The foregoing observations may be summarized for a closer comparative study as follows:

Cement	*Large granules.*		*Medium granules.*		*Fine powder.*	*Bubbles in setting.*
	Relative number.	Size of largest.	Relative number.	Average size.	Relative amount.	
A	Few.	35 microns	Many.	8-15 microns.	Small.	Many.
B	Few.	50 "	Few.	10-15 "	Large.	Many.
C	Few.	50 "	Many.	7-15 "	Small.	Very few.
D	Very few.	56 "	Few.	12-18 "	Very large.	Very many.
E	Very few.	25 "	Very many.	10-15 "	Small.	Few.
F	Few.	56 "	Many.	16-30 "	Large.	Few.
G	Few.	46 "	Many.	18-22 "	Large.	Very few.
H	Few.	40 "	Many.	5-20 "	Small.	Many.
I	Very few.	27 "	Very many.	10-15 "	Small.	Few.
J	Very few.	25 "	Very many.	8-15 "	Large.	Few.

As the cement granules do not dissolve when mixed with the liquid, and become a homogenous mass, it would seem from the foregoing measurements that some of the cements tested would be unsuitable for the purpose of setting inlays, or if they were used a matrix of corresponding thickness would have to be used in order to get space enough between the inlay and the cavity wall for the granules of cement. As has been noted in the descriptions of the various powders many of the larger granules are very irregular or flat in shape, and in microscopic examinations present the flat side to view. It is also quite evident that many if not all of these granules undergo some change upon coming into contact with the cement liquid, whereby they are reduced in size; another series of experi-

Fig. 32.



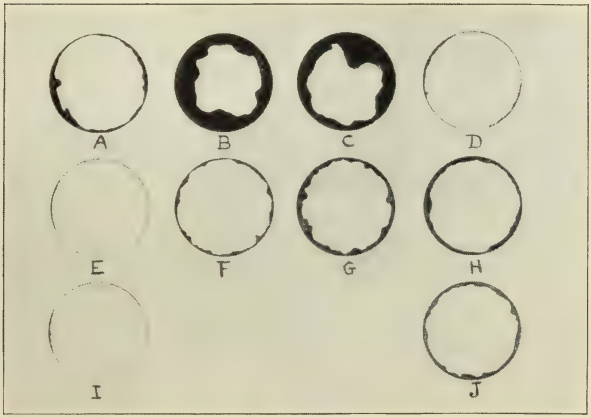
J—two hours.

FIG. 33.



J—two days.

FIG. 34.



Cover-glass films after remaining in water-eosin twenty-four hours.

FIG. 35.

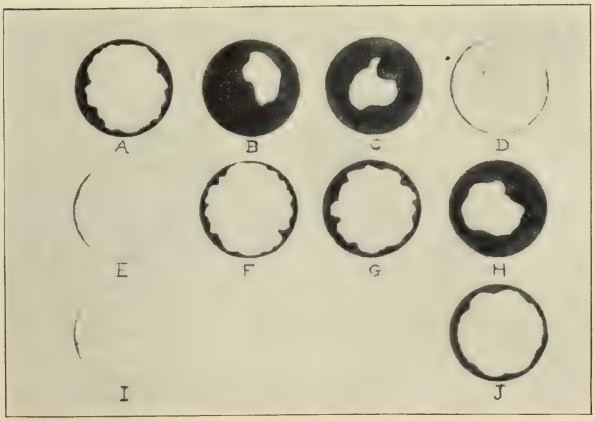
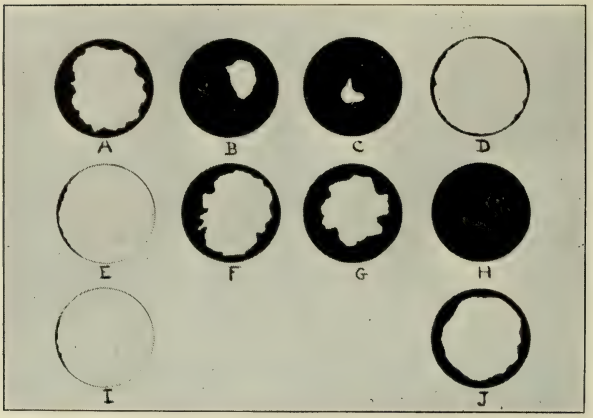
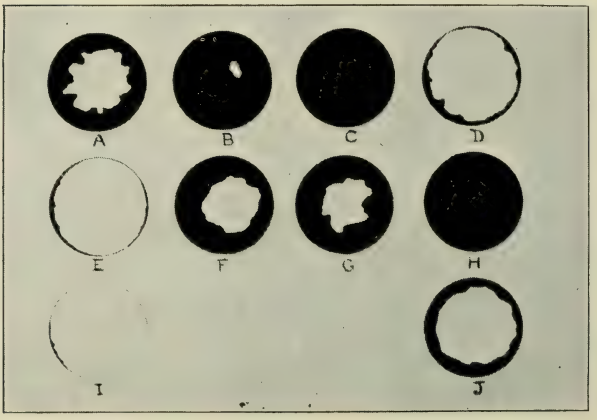


FIG. 36.



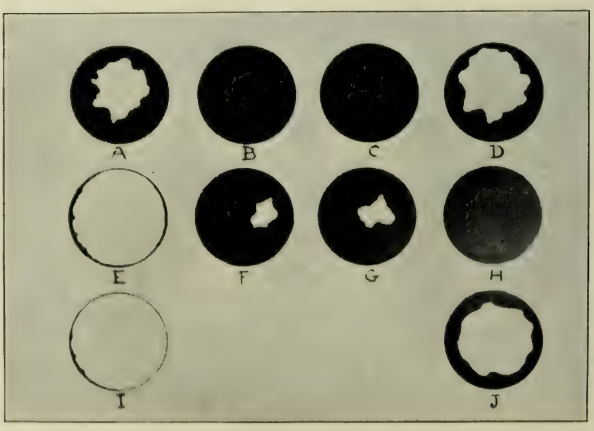
Cover-glass films after remaining in water-eosin three days.

FIG. 37.



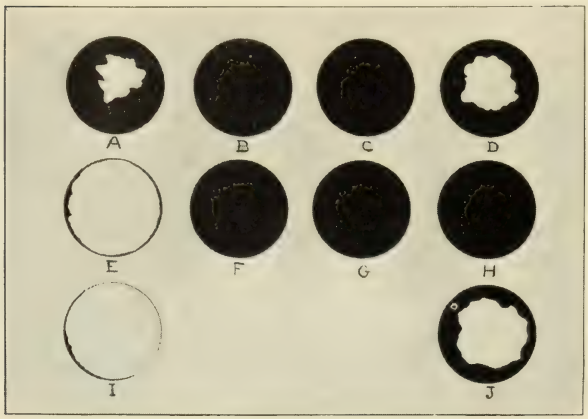
Cover-glass films after remaining in water-eosin four days.

FIG. 38.



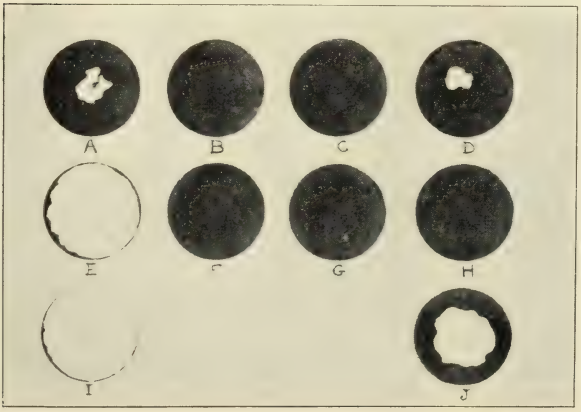
Cover-glass films after remaining in water-eosin five days.

FIG. 39.



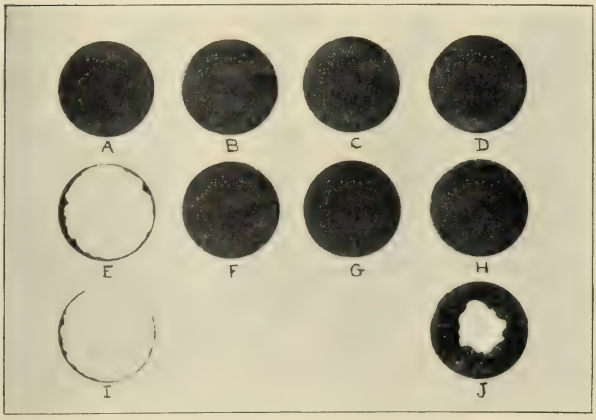
Cover-glass films after remaining in water-eosin six days.

FIG. 40.



Cover-glass films after remaining in water-eosin seven days.

FIG. 41.



Cover-glass films after remaining in water-eosin ten days.

ments was therefore made to determine the exact thickness of these granules when set.

Two cover glasses were accurately measured in the micrometer and a mix of cement of proper consistence for setting an inlay was made and placed between them. They were then subjected to a pressure of 25 pounds for fifteen minutes. This is the maximum pressure that would ever be brought by the fingers upon an inlay and is far beyond that which most operators would use, careful tests proving that from 10 to 15 pounds is all that can be generally exerted—and that for not more than two or three minutes at a time.

At the end of fifteen minutes the cover glasses with the film of cement between them were measured. They were again measured in 24 hours, and again in 72 hours, with the following results:

larger granules of the cement will be forced to the bottom of the cavity underneath the inlay and prevent it from being forced to position, while around the sides will be only the thinner portion of the cement which, owing to the excess of liquid, will be more readily soluble in the fluids of the mouth.

The expansion of these thin films is also worthy of careful consideration. For example: In *B, C,* and *G,* in which the expansion is from 30 to 100 per cent., we have an explanation for the broad band of cement showing around the inlay after a few days when at the time of setting the joint appeared to be perfect. *J* also expands too much, while *F,* and *I* could be better. *A,* and *E* show no expansion, but *A* is filled with bubbles, and it will be shown later that *E* lacks in adhesiveness. *D* contains far too many bubbles, and *H* has troubles of its own.

TESTS FOR EXPANSION OF COVER-GLASS FILMS. (DRY.)

Cement	Thickness of cement after setting fifteen min. under twenty-five lbs. pressure.	Thickness after setting twenty-four hours.	Expansion.	Subsequent change.
A	21 microns.	21 microns.	0 microns.	Slight expansion.
B	23 "	43 "	20 "	None.
C	22 "	44 "	22 "	None.
D	24 "	25 "	1 "	Slight increase in expansion.
E	27 "	27 "	0 "	None.
F	30 "	34 "	4 "	None.
G	32 "	42 "	10 "	None.
H	26 "	27 "	1 "	Slight increase in expansion.
I	31 "	35 "	4 "	Slight increase in expansion.
J	25 "	33 "	8 "	Slight increase in expansion.

Twenty-five microns is approximately 1/1000 of an inch. It would therefore seem that only five of the cements tested would permit the inlay to be placed into proper position if a 1/1000 matrix were used, and this would be under 25 pounds pressure. If this is true, then what will be the result in setting an inlay made to exactly fit the cavity by the swaging process? This: The inlay if flat will remain just the thickness of the cement film out of position, or if it be one with parallel or slightly converging sides the

For the purpose of determining the adhesiveness of the different cements, tests were made as follows: Blocks of ivory were carefully prepared with the surfaces to be cemented together having an area of 60 square millimeters, approximately that of the surface of a large inlay. These surfaces were roughened with a vulcanite file and the blocks were then cemented together. They were kept dry for 24 hours, when they were pulled apart with the following results, the number of pounds given being the aver-

age of a number of trials in each case. The highest and the lowest tests are also given:

TESTS FOR ADHESIVENESS. (Ivory blocks 60 sq. mm.)

Cement	*Force necessary to separate after twenty-four hours.*		
	Average force.	Highest.	Lowest.
A	46½ lb.	68 lb.	28 lb.
B	46 "	60 "	26 "
C	44¾ "	63 "	32 "
D	23½ "	30 "	18 "
E	31¾ "	37 "	20 "
F	45½ "	70 "	29 "
G	59¼ "	72 "	51 "
H	50¾ "	68 "	33 "
I	42¼ "	48 "	28 "
J	35¼ "	42 "	30 "

Repeated tests were made by cementing the blocks together and keeping them in saliva in the incubator at 37° C., but in every instance the force necessary to separate them was so slight that it was impossible to measure it with any degree of accuracy. These were flat surfaces, with the force applied perpendicular to the surface. When force was applied parallel with the surface, *i.e.* when an attempt was made to slide the blocks apart, considerable resistance was met with, the film of cement apparently interlocking into the uneven surfaces of the blocks on either side.

In these tests the capillary attraction between the cement and the ivory block is greater than the adhesiveness of the cement, and this has been the case with all of my tests except those in which the cement was covered with varnish, which would theoretically make it the same as if kept dry. But in the mouth we have all met with cases of old cement fillings in which it was necessary to chip away the last vestige of filling from the walls of the cavity, the adhesion being perfect, thus proving that adhesion does, in some cases at least, take place.

It is my belief that most inlays are retained in position solely by the retention form of the cavity, the accurate fit of the inlay and the cement on the one hand, and the cavity wall and the cement on the other; and that after a few days there is a film of moisture between the cement and the cavity wall and between the cement and the inlay, the cement acting merely as a key in locking the inlay into the cavity by means of its projections extending into the irregularities of the cavity wall on the one hand, and the depressions in the inlay formed by etching or grinding on the other.

Cements that contain bubbles and open spaces will undoubtedly permit the penetration of moisture; but to more certainly demonstrate this another series of experiments was made. Cover glasses were carefully etched and cleansed, and a mix of cement placed between each pair. These were held firmly together until they had set, when they were placed in water-eosin and kept in the incubator at 37° C. They were examined from day to day and drawings were made showing the extent to which the eosin had penetrated. The results can best be shown by the illustrations. (Figs. 34-42.)

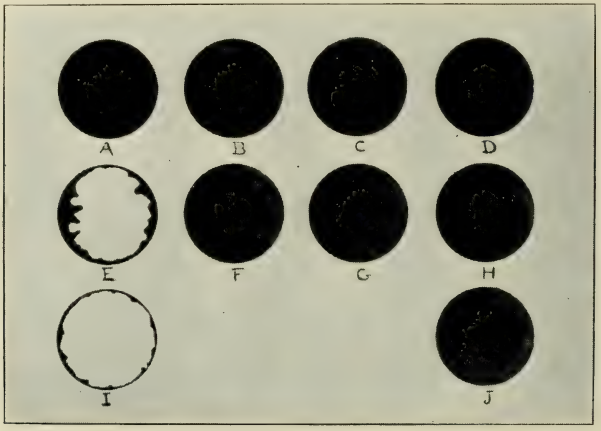
This penetration of the eosin is generally not within the body of the cement itself, but is between the cement and the glass, and a number of those cements which permit the eosin to pass between themselves and the glass are the so-called

impervious-to-moisture cements; *i.e.* they will withstand the common test of rolling up a pellet of the cement and dropping it into red ink or anilin dye, and after immersion for days, weeks, or months show no signs of penetration of the coloring matter. But that test is of little or no value whatever, for the defect is not in the cement itself but in the joint between the cement and the tooth. The cement may be perfectly insoluble, but that will not prevent moisture passing between it and the tooth. If moisture can enter, micro-organisms will enter, and decay result. This is further proved by the fact that nearly all old cement fillings that are removed from cavities in the teeth are discolored completely over the surface that was in contact with the tooth, while in the center they are still as bright and clear as when first inserted.

The results of the foregoing observations and experiments may not offer much assistance to the dentist who is looking for the best cement; for it is difficult, if not impossible, to say which is the best, so much depending upon the particular purpose for which it is to be used. The individual case will in a large measure have to determine the kind of cement that will best fulfill its requirements. Again, so much depends upon proper mixing and care in keeping some cements that it is impossible to foretell the results of any one of them in the hands of different operators.

It is therefore advisable that every dentist shall do some experimenting, that he may know from experience what is actually taking place as a result of his own manipulation. In so doing he may be able to better his own work, or at least save himself from embarrassment through ignorance of that which he is using.

Fig. 42.



Cover-glass films after remaining in water-eosin two weeks.

TESTS ON THE INLAY CEMENT PROBLEM.

By JOSEPH HEAD, M.D., D.D.S., Philadelphia, Pa.

(Read before the New York Odontological Society at its regular monthly meeting, February 21, 1905.)

IN porcelain inlay work the cement line arising from the removal of the matrix has always been a subject of general criticism and discussion. Because No. 30 gold foil is one-third the thickness of the 0.001 in. platinum foil, gold is said to make a finished filling that has a cement line one-third the thickness of the cement line of a filling where a platinum matrix is used. The method of inlay making in which a perfect fit is supposed to be obtained by eliminating the thickness of the matrix, implies that all of the cement is squeezed out of the edges, which is obviously absurd if the inlay is to be held in position.

These and other statements have prompted me to undertake experiments for the purpose of solving the following questions:

A—(1) What is the minimum thickness of cement capable of being obtained at the edges of an inlay? (2) Is pressure or fineness of cement grit more responsible for obtaining a fine line? (3) Is it of any practical value to maintain pressure for more than a minute while the cement is setting?

B—(1) Does a thick or thin line give the greater strength of retention? (2) Is a fine grit or coarse grit cement the stronger?

C—(1) What is the adhesive strength of glazed porcelain cemented to smooth ivory? (2) What is the adhesive strength of etched porcelain cemented to smooth ivory? (3) What is the adhesive strength of etched porcelain cemented to undercut ivory? (4) What is the adhesive strength of undercut porcelain cemented to undercut ivory?

To ascertain the minimum thickness of the cement line, pieces of glass one-quarter inch square were cemented to pieces of glass one-half inch square. These pieces of glass were so true as to permit atmospheric suction when pressed together in a dry state. To facilitate the removal of the cement film, the surface was slightly oiled by rubbing on the skin. Pressures of 8, 25, 50, and 100 pounds were used with various grits of the Harvard cement as well as with the Ames inlay cement, to see if pressure or fineness of grit was most responsible for the thin cement line. These pressures in half the number of instances were maintained for a minute only and the further setting continued without pressure. With the other half, the pressure was maintained until setting was complete. This was done to see if the maintaining of the pressure for more than one minute was of any practical value in reducing the cement line. The one-quarter inch square film was chosen as a standard cement surface. This is larger than the average surface of a porcelain inlay, but since the films were made under 8, 25, 50, and 100 pounds pressure, it was considered that one-eighth inch square film was under a pressure of 2, 6¼, 12½, and 25 pounds respectively. And as from 2 to 6 pounds was found from experiment to be the pressure applied to fillings in the mouth, it was considered that definite conclusions could be obtained from 8, 25, 50, and 100 pounds pressure applied to films one-quarter inch square, and these films would be large enough to measure at several points and give an average thickness. The measurements for thickness were made on the Black amalgam micrometer (Cosmos, vol. xxxvii, page 644) and those for pressure on the Black dynamometer (Cosmos, vol. xxxvii, page 409). All of these films were allowed to set in a dry state, and it was found that when

they were dipped in water the glass pieces separated and the complete film was easily floated off, picked up on a camel's-hair brush and attached to the face plate of the micrometer, when the various readings were obtained by floating the film of cement on a film of water between the measuring terminals. This supporting film of water was found to be 0.0001 in. in thickness in the following way: A reading was taken while the wet film was still adherent to the glass. The cement film was then loosened so that a film of water could creep underneath. The reading was again taken and invariably found to be 0.0001 in. greater. Thus 0.0001 in. will be deducted from every reading given in the tables of film measurements unless otherwise stated. The readings of the Black amalgam micrometer were controlled by the Brown & Sharpe micrometer, and while the Brown & Sharpe micrometer could not measure so minutely, in so far as it could measure the figures for both instruments were the same. The pressure generally used in cementing fillings in the mouth was arrived at in the following manner: Porcelain inlays containing about one-eighth inch square of surface were made to fit cavities in a block of ivory. This block of ivory was then placed on scales and the fillings cemented into position. Without looking at the dial, pressures were used such as were felt to be ordinarily used in the mouth, while an assistant noted the readings. It was found that 2 pounds was the pressure such as would be used where there were frail edges, 3 to 4 pounds were safely applied to ordinary fillings, and 6 pounds seemed the maximum pressure that would ordinarily be applied to a filling of one-eighth inch square surface. This equals one-half pound for frail fillings of one-sixteenth inch square surface. These measurements on the force usually applied in the mouth make the tests of 8 and 25 pounds pressure the only ones of practical working value, but, as previously stated, films of cement were also made under 50 and 100 pounds pressure to determine the minimum cement line and to determine whether the pressure under which the cement was set or the fineness of the grit was most responsible for this minimum line.

As previously stated, Ames inlay and Harvard cements were used. Of the Harvard cement four different grits were used. (1) The Harvard coarse, such as is ordinarily used for making fillings and such as was for a long time ordinarily used for cementing inlays. (2) The Harvard inlay cement as prepared for Dr. Jenkins. (3) A finer grit Harvard which I have had prepared and have used up to the time of these tests. This I shall speak of as the Harvard special. (4) A Harvard cement that I pulverized in an agate mortar until the grit was almost imperceptible to the teeth. This I shall refer to as the Harvard pulverized.

No use was made of a reduced grit of Ames inlay cement, as it was found that any reduction of the powder so hastened the setting as to render the cement unavailable.

Using 8 pounds pressure the average thickness of cement line was found to be as follows:

Harvard coarse	.0024 in.
Harvard inlay	.0017 "
Harvard special	.0015 "
Harvard pulverized	.0003 "
Ames inlay	.0010 "

(See Tables 1-6, 13-15.)

The tests of 25, 50, and 100 pounds pressure were made only on the Harvard special and the Ames inlay cement. (See Tables 7-12, 16-21.) These were only of interest in showing that there was an inverse ratio between the pressure and the cement line. In other words, the greater the pressure the finer the line obtained. The Harvard special at 100 pounds gave a line 0.0009 in. in thickness and the Ames at 100 pounds gave a line 0.0006 in. in thickness, while the Harvard pulverized at but 8 pounds gave a line less than 0.0003 in. Therefore, it seems that a finer grit is a much more important factor than pressure in obtaining a fine line.

Maintaining the pressure until setting was complete instead of maintaining it for one minute, was found to result in a

difference of only 0.00005 in., a difference less than the probable working error of the operator. The result was obtained by taking the general average of all the films made under maintained pressure, comparing it with the general average of all the films set under a pressure for one minute only. However, though this is of little importance in reducing the cement line, it is possible that it is of great importance in increasing the adhesion. This will be discussed later.

The Ash cement was partially measured as to its cement film (see Table 22) and was found to be capable of giving a film of 0.0023 in., a little less than that of the Harvard coarse and considerably over twice the thickness of the ordinary platinum inlay foil.

TABLE 1.—*Harvard coarse W.*

Harvard coarse W = Harvard coarse grit, pressure 8 pounds on one-quarter square in. glass for 1 minute.

Water film that floated cement on face plate measured 0.0001 in. Therefore, 0.0001 in. should be subtracted from each result as an error due to measuring the water film with the cement film.

In.	In.	In.	In.	In.	Average.
.00275	.0026	.00255	.0027	.00265	= .00250
.00245	.00265	.00270	.00250	.00260	= .00258
.00242	.00215	.00225	.00250	.00236	= .002526
.00242	.00260	.00280	.00265	.00265	= .002624
.00220	.00226	.00230	.00220	.00225	= .002442

General average, .002534 in.
Corrected average, .002434 in.

TABLE 2.—*Harvard coarse W'.*

Harvard coarse W' = Harvard coarse W, only pressure is maintained until complete setting.

In.	In.	In.	In.	In.	Average.
.00260	.00285	.00270	.00270	.00260	= .00269
.00230	.00235	.00225	.00215	.00215	= .00226
.00280	.00272	.00250	.00276	.00284	= .002724
.00290	.00300	.00284	.00294	.00290	= .002901
.00250	.00250	.00250	.00245	.00245	= .002408

General average, .002596 in.
Corrected average, .002496 in.

TABLE 3.—*Harvard inlay W.*

Harvard inlay W = Harvard inlay cement, one-quarter square in. glass, 8 pounds pressure for 1 minute and then released until setting occurs.

In.	In.	In.	In.	In.	Average.
.00175	.00180	.00180	.00185	.00180	= .0018
.00165	.00182	.00195	.00186	.00165	= .00179
.00180	.00175	.00165	.00176	.00180	= .00173
.00170	.00180	.00192	.00185	.00180	= .00181
.00178	.00185	.00184	.00175	.00175	= .00179

General average, .00178 in.
Corrected average, .00168 in.

TABLE 4.—*Harvard inlay W'.*

Harvard inlay W' = Harvard inlay W, only 8 pounds pressure is maintained until setting occurs.

In.	In.	In.	In.	In.	Average.
.00180	.00170	.00160	.00175	.00170	= .00171
.00175	.00188	.00175	.00175	.00175	= .00177
.00185	.00195	.00190	.00195	.00190	= .00195
.00205	.00172	.00195	.00185	.00195	= .00194
.00165	.00170	.00175	.00170	.00160	= .00168

General average, .00181 in.
Corrected average, .00171 in.

Water film that floated cement on face plate measured 0.0001. Therefore, 0.0001 in. should be subtracted from each result as an error due to measuring the water film with the cement film.

TABLE 5.—*Harvard special.*

Harvard = Harvard special cement especially prepared for Dr. Head and the kind he used before these tests were undertaken.

Water film that floated cement on face plate measured 0.0001 in. Therefore, 0.0001 in. should be substracted from each result as an error due to measuring the water film with the cement film.

Harvard W = Harvard special, one-quarter in. glass, 8 pounds pressure for 1 minute and released until setting occurs = one-eighth in. glass under 2 pounds pressure.

In.	In.	In.	In.	In.	Average.
.0015	.00145	.00155	.00155	.00155	= .00152
.0017	.0018	.0019	.0017	.0019	= .0018
.00195	.0015	.0018	.0017	.00195	= .00176
.00155	.00155	.00165	.00165	.0016	= .0016
.0015	.00155	.0016	.0017	.0018	= .00163

General average, .00166 in.
Corrected average, .00156 in.

TABLE 6.—*Harvard W'.*

Harvard W' = same as Harvard W, only pressure is continued for 15 minutes or until set.

In.	In.	In.	In.	In.	Average.
.0015	.0016	.0015	.0017	.00175	= .00161
.00145	.0015	.00165	.0016	.00145	= .00153
.00195	.00175	.0018	.0017	.00195	= .00171
.00145	.00155	.0016	.00175	.0018	= .00163
.0016	.0018	.0017	.00145	.00165	= .00164

General average, .00162 in.
Corrected average, .00152 in.

TABLE 7.—*Harvard X.*

Harvard X = Harvard special, 25 pounds pressure for 1 minute and released until set.

Water film that floated cement on face plate measured 0.0001 in. Therefore, 0.0001 in. should be subtracted from each result as an error due to measuring the water film with the cement film.

In.	In.	In.	In.	In.	Average.
.00145	.00155	.00155	.00155		= .00152
.00155	.00142	.00145	.00148	.00134	= .00155
.00145	.00130	.00148	.00160	.00145	= .00145
.00160	.00152	.00144	.00164	.00155	= .00155
.00150	.00172	.00161	.00162	.00152	= .00159

General average, .00153 in.
Corrected average, .00143 in.

TABLE 8.—*Harvard X'.*

Harvard X' = Harvard special, 25 pounds pressure until set, or about 30 minutes.

In.	In.	In.	In.	In.	In.	Average.
.0016	.00135	.0013	.0016	.0013	.0014	= .00145
.00125	.00115	.00120	.00120	.00135		= .00145
.00132	.00125	.00134	.00125	.00130		= .00129
.00132	.00132	.00125	.00130	.00130		= .00130
.00110	.00122	.00110	.00110	.00108		= .00129

General average, .00135 in.
Corrected average, .00125 in.

TABLE 9.—*Harvard Y.*

Harvard Y = Harvard special, under 50 pounds pressure, one-quarter in. glass, 1 minute and then released until set.

In.	In.	In.	In.	In.	Average.
.00120	.00125	.00145	.00125		= .00129
.00105	.00120	.00085	.00098	.00080	= .000976
.00120	.00145	.00145	.00135	.00135	= .00136
.00090	.00100	.00095	.00100	.00085	= .00094
.00160	.00140	.00150	.00135	.00135	= .00124

General average, .00116 in.
Corrected average, .00106 in.

TABLE 10.—*Harvard Y'.*

Harvard Y' = Harvard special, under 50 pounds pressure, one-quarter in. glass, until set.

In.	In.	In.	In.	In.	In.	In.	Average.
.00125	.0015	.00125	.0013	.0015	.00135	.0015	= .00133
.00135	.00140	.00130	.00160	.00150			= .00143
.00130	.00115	.00120					= .00122
.00110	.00115	.00135	.00140	.00135	.00105		= .001235
.00135	.00110	.00125	.00110	.00100			= .00116

General average, .001275 in.
Corrected average, .001175 in.

TABLE 11.—*Harvard Z.*

Harvard Z = Harvard special, under 100 pounds pressure, one-quarter in. glass, 1 minute, released until set.

In.	In.	In.	In.	In.	Average.
.00140	.00125	.00155	.00120	.00150	= .00138
.00120	.00125	.00125	.00110	.00125	= .00121
.00110	.00115	.00095	.00120	.00120	= .00112
.00110	.00110	.00125	.00130	.00120	= .00121
.00130	.00120	.00130	.00135	.00125	= .00128

General average, .00124 in.
Corrected average, .00114 in.

TABLE 12.—*Harvard Z'.*

Harvard Z' = Harvard special, 100 pounds pressure until set, one-quarter in. glass.

In.	In.	In.	In.	In.	In.	Average.
.00095	.00100	.00125	.00100	.00095	.001	= .00102
.00085	.00100	.00070	.00090	.00115		= .00092
.00110	.00110	.00098	.00105	.00080		= .00101
.00110	.00085	.00100	.00105	.0090		= .00098
.00110	.0090	.00100	.00105	.0090	.00110	= .00101

General average, .00099 in.
Corrected average, .00089 in.

TABLE 13.—*Harvard pulverized W'.*

Harvard pulverized W' = Harvard pulverized cement; factor of error due to water line not present, as the measurements were made on adhesive films and where pressure of 8 pounds was maintained until setting occurred.

In.	In.	In.	In.	In.
.00015	.0003	.00015	.0002	.00035
.00035	.00025	.0002	.00035	.0003
.0003	.00025	.00025	.0003	.0003

General average, .00027 in.

Tests of the Ames inlay cement to determine the thickness of the film under given surfaces, times, and pressures, were as follows:

TABLE 14.—*Ames W.*

Ames W = Ames one-quarter in. square glass at 8 pounds pressure for 1 minute =

one-eighth in. square glass at 2 pounds for 1 minute.

Water film that floated cement on face plate measured 0.0001 in. Therefore, 0.0001 in. should be subtracted from each result as an error due to measuring the water film with the cement film.

In.	In.	In.	In.	In.	In.	In.	Average.
.00105	.0011	.00105	.0012	.001	.00105		= .00107
.0014	.0012	.00115	.0013	.0015	.0011	.00125	= .00127
.0012	.0012	.00115	.0013	.0012			= .00121
.00115	.0012	.00115	.00105	.00105			= .00112
.0012	.00125	.0015	.0013	.0012			= .00129

General average, .00119 in.
Corrected average, .00109 in.

TABLE 15.—*Ames W'*.

Ames W' = one-half in. square glass at 8 pounds pressure for 15 minutes or until complete setting = one-eighth in. square glass at 2 pounds for 15 minutes or until set.

In.	In.	In.	In.	In.	In.	Average.
.001	.00095	.001	.001	.00105	.001	= .001
.001	.0011	.00105	.001	.00105		= .001+
.001	.001	.0011	.0012	.0012		= .0011
.00105	.00105	.0011	.0011	.00112		= .0011+
.00112	.00112	.00112	.00112	.00112		= .00112

General average, .00106 in.
Corrected average, .00096 in.

TABLE 16.—*Ames X*.

Ames X = one-quarter in. square glass, 25 pounds pressure for 1 minute, released, and allowed to harden.

In.	In.	In.	In.	In.	Average.
.001	.001	.001+	.001	.00105	= .00101
.00105	.0085	.0009	.00095	.001	= .00095
.00095	.001	.0011	.00095	.001	= .001
.00085	.0009	.00105	.0011	.001	= .00098
.00095	.001	.00105	.001	.00095	= .00099

General average, .000986 in.
Corrected average, .000886 in.

TABLE 17.—*Ames X'*.

Ames X' = one-quarter in. square glass, 25 pounds continuous pressure until hard.

In.	In.	In.	In.	In.	In.	Average.
.00085	.0009	.0009	.0009	.0009		= .00089
.00085	.0009	.00105	.0011	.001		= .00098
.0012	.001	.0014	.0012	.00095	.00103	= .00113
.00095	.00082	.001	.0011	.00085		= .00094
.0009	.001	.0009	.0011	.00095		= .00097

General average, .000982 in.
Corrected average, .000882 in.

TABLE 18.—*Ames Y*.

Ames Y = one-quarter in. square glass, 50 pounds pressure for 1 minute, released, and allowed to harden.

In.	In.	In.	In.	In.	Average.
.00075	.0008	.00085	.00075	.00085	= .0008
.0008	.00095	.00085	.00085	.0009	= .00085
.0009	.00085	.0008	.00088	.00085	= .000856
.0008	.0008	.0009	.00095	.00085	= .00086
.00065	.00075	.0008	.00075	.00085	= .00076

General average, .000825 in.
Corrected average, .000725 in.

TABLE 19.—*Ames Y'*.

Ames Y' = one-quarter in. square glass, 50 pounds continuous pressure until hard.

In.	In.	In.	In.	In.	Average.
.0008	.00075	.00082	.00082	.00085	= .000808
.0008	.00075	.00077	.00072	.00069	= .000746
.00095	.00085	.0007	.0008	.0008	= .00082
.001	.00085	.00075	.00085	.001	= .00089
.0007	.00085	.0007	.0008	.0007	= .00075

General average, .000802 in.
Corrected average, .000702 in.

TABLE 20.—*Ames Z*.

Ames Z = one-quarter in. square glass, 100 pounds pressure for 1 minute, released, and allowed to harden.

In.	In.	In.	In.	In.	Average.
.00085	.00085	.00095	.0009	.00005	= .00093
.00085	.0007	.00095	.0007	.00075	= .00079
.00095	.00085	.0007	.0008	.0008	= .00082
.001	.00085	.00075	.00085	.001	= .00089
.0011	.001	.00095	.00095	.0011	= .00102

General average, .00089 in.
Corrected average, .00079 in.

TABLE 21.—*Ames Z'*.

Ames Z' = one-quarter in. square glass, 100 pounds pressure until hard.

In.	In.	In.	In.	In.	In.	Average.
.0008	.00082	.00075	.0007	.0008	.0007	= .00076
.00065	.00075	.0007	.0006	.0008	.00085	= .000725
.00075	.00065	.0008	.0007	.00065		= .00071
.00061	.00073	.00061	.0006	.00062		= .000634
.0006	.00065	.00065	.00085	.00075		= .00007

General average, .000704 in.
Corrected average, .000604 in.

TABLE 22.—*Ash W*.

Ash W = Ash common phosphate of zinc cement, 8 pounds pressure, one-quarter in.

square glass, for 1 minute, and released until hard.

In.	In.	In.	In.	In. Average.
.0021	.00215	.00195	.00195	.00212 = .00206
.0022	.0023	.0024	.00235	.00225 = .00230
.00231	.00230	.00230	.00230	.00230 = .00230
.00215	.0029	.00265	.00210	.00220 = .0024
.00280	.0029	.00290	.00310	.00280 = .0029

General average, .00239 in.
Corrected average, .00229 in.

Comparisons.

Comparisons of corrected general averages of cement lines made under 8 pounds pressure: W = released after 1 minute. W′ = pressure maintained until setting is complete.

Except in Harvard pulverized, which was measured adhering to glass, 0.0001 in. was subtracted from each as a factor of error.

Harvard coarse W.	corrected,	.00243 in.
Harvard coarse W′,	"	.00249 "
Harvard inlay W,	"	.00168 "
Harvard inlay W′,	"	.00171 "
Harvard W,	"	.00156 "
Harvard W′,	"	.00152 "
Harvard pulverized,*	"	.00027 "
Ash W,	"	.00229 "
Ames W,	"	.00109 "
Ames W′,	"	.00096 "

X = 25 pounds pressure one-quarter in. square glass for 1 minute, then released until setting occurs.

X′ = 25 pounds pressure one-quarter in. square glass until complete setting occurs.

Y = 50 pounds pressure one-quarter in. square glass for 1 minute, then released until setting occurs.

Y′ = 50 pounds pressure one-quarter in. square glass until setting occurs.

Z = 100 pounds pressure one-quarter in. square glass for 1 minute, then released until setting occurs.

Z′ = 100 pounds pressure one-quarter in. square glass until setting occurs.

H = Dr. Head's special Harvard.

A = Ames inlay cement.

Correction for water film, 0.0001 in.

Comparison of corrected general averages between the Harvard special and the Ames inlay cements.

H X = .00143 in.	A X = .000886 in.
H X′ = .00125 "	A X′ = .000882 "
H Y = .00106 "	A Y = .000725 "
H Y′ = .00115 "	A Y′ = .000702 "
H Z = .00114 "	A Z = .00079 "
H Z′ = .00089 "	A Z′ = .000604 "

* Adhesive tests.

Having discussed the fineness of cement lines and the laws that govern their formation, let us take up the question of strength and adhesion. As before stated, the Harvard cement and the Ames inlay cement were the only cements investigated. Of the Harvard, the coarse and the pulverized were used as two extremes to show which gave the greatest strength and the most adhesion. The Ames inlay, for reasons previously given, was used in its original grit only.

Before going over the adhesion tests, let us first examine closely what we wish to determine. (1) Does a thick or thin line give greater strength of retention? (2) Is a fine grit or a coarse grit cement the stronger? (3) What is the adhesive strength of ground porcelain to smooth ivory? (4) What is the adhesive strength of etched porcelain to smooth ivory? (5) What is the adhesive strength of etched porcelain to undercut ivory? (6) What is the adhesive strength of undercut porcelain to undercut ivory?

The first adhesion tests were made with the glass squares etched with hydrofluoric acid. Pieces one-quarter in. square were cemented to pieces one-half in. square under 8 pounds pressure for 15 minutes, set in water over night. Two specimens of Harvard coarse, three of Harvard pulverized, and two of Ames inlay were thus prepared. In the morning the glasses all fell apart. This result showed that the expansion and contraction of the glass was sufficient to tear it loose from the cement. At first it was thought the tests would have to be made in a culture oven at a temperature of 98⅖°, the normal temperature of the mouth; but tests with a clinical thermometer in the mouth after eating hot soup at 152° showed that the mouth could have a temperature of 108⅗°. This made it clear that experiments made in an even temperature would not be fair, as it was apparent that a filling might be subjected to hot soup at a temperature of 152° and ice cream at a temperature of 32°, a variation of 120°. Therefore, for the adhesion tests glass was discarded and pieces of porcelain one-quarter in. square and one-sixteenth in. thick, perfectly flat, were cemented to a block of ivory that

had been draw-filed flat and smooth. In all of these tests the porcelain and ivory were washed in alcohol and dried before they were cemented together. In the tests where the porcelain was only ground with a wheel the results were so discouraging that they will only be summarized. The porcelain pieces were carefully ground to measure exactly one-quarter in. square to the Brown & Sharpe gage, as it was held that equal cement surfaces should be had if a just comparison was to be obtained.

A number of tests were made under 8 pounds pressure and thumb pressure until setting was complete, and some under thumb pressure for a minute, and then released. The Harvard cement was paraffined before being placed in water. The Ames inlay cement was not paraffined, as Dr. Ames says it sets best unprotected. The following morning the pieces of ivory and porcelain were removed from the water, dried with a cloth, and the paraffin and cement carefully cleansed from the edges. The ivory block was then placed in a vise and the pieces of porcelain pulled off sideways with the hook of a spring balance scale. Before each test the dial of the balance was blackened in a gas jet so that the indicator would mark the highest point reached as the cement broke and the pointer flew back. These same spring scales were arranged with nails and board so that they could be used to maintain the required pressure on the cement films as they were setting. The results obtained were so insignificant, there being practically no difference between the maintained pressure, the temporary pressure, the 8 pounds pressure, and the 4 pounds or thumb pressure, that for the plain, ground porcelain surfaces I shall only quote those made under thumb pressure released after one minute, and then set in water over night. The tests made with the Harvard coarse gave a breaking strain of the following figures: 3, 5, 14, 19, 21, 13, 27, 28, 34, 42 oz.—an average of 20 oz.

The Harvard pulverized gave the following figures: 10, 10, 16, 8, 31, 35, 11, 16, 54, 32 oz.—an average of 22 oz. The Ames cement under similar conditions gave: 0, 0, 64, 20, 10, 6, 0, 0, 10, 32 oz. —an average of 14 oz.

These roughly show a slight superiority of adhesion for the pulverized Harvard, but is not sufficiently conclusive to be of great value. It certainly shows that the adhesion of cement to ground porcelain and to flat, smooth ivory is slight and unreliable. In these tests the cement film seemed to break away equally from the porcelain and ivory.

Having proved that draw-filed ivory and ground porcelain have very little adhesion to cement, these pieces of porcelain were etched for 30 seconds with hydrofluoric acid, washed thoroughly with water, dried, washed in alcohol, and dried again. The blocks of ivory were simply given the ordinary soaking in water to make them as much like the tooth-structure as possible, were wiped dry with a cloth, the surfaces washed with alcohol, and dried with the air blast. Because the hydrofluoric acid had caused such little adhesion of the cement to the glass, I had doubts as to whether it would cause adhesion to a flat surface of porcelain. I knew that roughening the surface of a rod or deep filling would cause the cement to retain the filling as with undercuts, but there was much doubt in my mind concerning the power of etching to cause adhesion of cement to a flat surface.

Six preliminary tests were made with the one-quarter in. square of etched porcelain cemented to the ivory blocks under 8 pounds pressure for one minute and then released—two with Harvard coarse, two with Harvard pulverized, and two with Ames inlay. Next morning, the four Harvard cement films tore away from the ivory at about a 67 oz. pull, remaining firmly adherent to the porcelain, while the Ames cement dropped off the ivory with a pull too small to be measured. This seemed to give a maximum adhesion of the Harvard cement to plain ivory one-quarter in. square of a little over 4 pounds.

It was then seen that if the adhesion of cement to etched porcelain was to be measured, some way would have to be

devised to make the cement stick more securely to the ivory. This was done by making undercuts in the ivory, a little less than one-quarter in. square. These undercuts were filled with the cement and the pieces of etched porcelain pressed upon the overflowing cement, kept under 8 pounds pressure for one minute, and then released and treated in the usual way. Next morning, when these pieces of porcelain were pulled off, the two etched squares of porcelain broke loose from the Harvard coarse cement at 16 pounds and 22 pounds respectively. Those from the Harvard pulverized at 12 pounds and 12 pounds each. The Ames broke at 6 pounds and 3 pounds each. In each test there was clean tearing away of the porcelain from the cement. The next tests were identical with those just described, only the old cement in the undercuts was simply filed smooth, and the cleansed porcelain squares cemented under 8 pounds pressure for one minute to the old cement and the adjacent ivory that had simply been washed with alcohol and dried. Further tests proved that the fresh cement would stick to the old cement more firmly than it would stick to the etched porcelain.

The following tables and their general averages tell their own story. Tests as previously stated were made under 8 pounds pressure for one minute. These same tests were duplicated where the 8 pounds pressure was maintained until setting was complete. The Harvard coarse under 8 pounds pressure for one minute, released, paraffined, set in water over night and pulled off in the morning showed that etched porcelain broke away from undercut ivory at 16, 22, 16, 12, 11, 13, 15, 20, 16, 11, 12, 14, 14, 14, 16, 12, 15, 10 pounds. General average, 13 pounds, 2 ounces to one-quarter in. square surface. When the pressure was maintained until setting occurred, the breaking strain was found to give the following figures: 6, 16, 13, 10, 12, 18, 13, 4, 10, 8, 9 pounds, giving a general average of 11 pounds 10 ounces. This shows that with the Harvard coarse maintaining the pressure did not increase the adhesion. These same tests were made with the Harvard pulverized. Where the 8 pounds pressure was maintained for 1 minute only, we have the following figures: 12, 12, 13, 8, 9, 13, 18, 21 pounds, giving a general average of 13 pounds, 4 ounces. Where pressure was maintained until setting was complete, the following were the figures: 16, 12, 25, 24, 28, 17, 14, 13, 24, 16, 17, 13, 17, 12, 19, 16 pounds, giving a general average of 17 pounds, 7 ounces.

With Ames tests where 8 pounds pressure at one minute was maintained, the following figures: 6, 3, 13, 13, 0, 17, 11, 3 pounds, giving a general average of 8 pounds, 4 ounces.

Where the pressure was maintained until setting occurred, Ames cement gave the following figures: 6, 8, 6, 7, 14, 16, 12, 11, 11, 13, 12, 9, 8, 10, 7, 8, 7 pounds, giving a general average of 9 pounds, 9 ounces.

Summary.

General average for 8 pounds pressure for 1 minute only:

Harvard coarse	13	lb.,	2	oz.
Harvard pulverized	13	"	4	"
Ames inlay	8	"	4	"

General average of general averages, 11 pounds, 8 ounces.

General average for 8 pounds pressure until setting is complete:

Harvard coarse	11	lb.,	10	oz.
Harvard pulverized	17	"	7	"
Ames inlay	9	"	9	"

General average of general averages, 12 pounds, 14 ounces.

The fact that the Harvard coarse cement does not show greater stress-bearing power when the pressure was maintained until complete setting is possibly explained by the fact that with the coarse powder sometimes a particle might be so large as to prevent general pressure. Certainly with the Harvard cement it is clear that the finer the powder the finer and truer the film and the stronger the adhesion. These tests also show that new cement will stick firmly to old cement; that a thin film does not seem to be as

strong as a thick film; that ground porcelain and roughened ivory have little adhesive power, while etched porcelain has great power of adhesion to cement. This seemed at first an anomaly, since etching with hydrofluoric acid has no such power on glass; but a little thought will solve the difficulty. Glass is a homogeneous substance, and etches smoothly and homogeneously, but porcelain being composed of quartz, feldspar, and flux, etches unevenly in pits and undercuts.

The fact that the old cement will adhere to the new cement more firmly than the new cement will adhere to the etched porcelain makes it feasible to fill undercut cavities with cement until setting occurs, and then to cut out of the cement a simple cavity with clean enamel edges. Thus may a difficult filling be converted into a simple filling.

Numerous tests were made with the flat porcelain on which zinc oxid had been fused, to see if such porcelain had greater adhesion to the cement than etched porcelain. When zinc oxid was given just the right fusion one-quarter in. square of porcelain with Harvard pulverized stood as high as 30 pounds pressure, but the next fusing of zinc oxid to the porcelain, made with equal care, gave sometimes no adhesion at all, or only 2 or 3 pounds. Therefore, although at first I had great hope that the principle of partially fusing zinc oxid to the porcelain filling for purposes of adhesion might prove of value, its unreliability finally compelled me to believe that etching with hydrofluoric acid is by all odds the most feasible and trustworthy.

Filling Test.

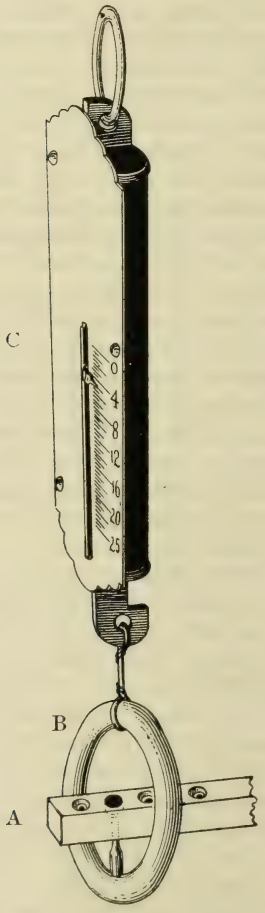
In order finally to verify the accuracy of these data, it was decided to make a series of ten porcelain fillings of standard size in a piece of ivory, and after they had been cemented into position under various conditions with Ames and pulverized Harvard cements respectively, to push the fillings out of the cavities by a plunger inserted from below, attached to a scale.

The cavities were made and reamed to standard size by a reamer five-sixteenths in. in diameter at the top, two-sixteenths in. deep, and three-sixteenths in. in diameter at the bottom. Holes were carefully bored in the bottom of each cavity through the piece of ivory to make a passage for the plunger. The porcelain fillings were made with platinum molds in the usual way, the holes in the bottom of the cavities being temporarily stopped with wooden plugs. The plunger that fitted easily into these holes was cemented into the inside of a celluloid ring so that the pressure might be made on the plunger by means of a spring balance hook inserted in the ring. When the pressure tests were to be made, the block of ivory containing the cemented inlays was placed upright in a vise. The ring containing the plunger was slipped over it and the plunger inserted in the hole beneath the filling to be tested; then the spring balance hook was placed in the ring, and pressure made until the filling was loosened. The exact pressure reached on the giving way of the fillings was measured by the needle marking a carbon film on the scale as described previously in the other adhesion tests.

The first two tests were to obtain the adhesion of perfectly smooth-cut ivory walls to smooth, glazed, closely fitting porcelain. Such fillings in such cavities were cemented into place with pulverized Harvard cement at thumb pressure for one minute and then allowed to set, care being taken to remove all superfluous cement in the holes under the fillings, so that there would be free movement and apposition of the plunger against the porcelain pieces. The fillings were then paraffined, and placed in water over night. In the morning not one of these fillings stood a pressure of 8 ounces, and most of them came out with less. The fillings and cavities were then carefully cleansed of cement with diluted sulfuric acid, and washed in alcohol and dried. The fillings were then re-cemented into position with Ames inlay cement, with a similar result—no filling stood more than 8 ounces, and most came out with a pressure of 2 or 3 ounces. These tests proved that plain

ivory surfaces in apposition with glazed porcelain with a thin film of cement did not make a satisfactory union.

The next two tests were made under exactly similar conditions, only the fillings were etched with hydrofluoric acid for 30 seconds. The walls of the cavities



Instrument for measuring the force required to dislodge porcelain inlays. A, Piece of ivory with cavities. B, Ring with plunger. C, Scale.

were smooth and without undercuts. The following represent the figures: Harvard pulverized: 37, 28, 47, 96, 20, 30, 34, 66, 64, 88 ounces respectively. General average, 3 pounds, 3 ounces. Ames inlay: 40, 40, 32, 57, 90, 64, 39, 33, 38, 37 ounces respectively. General average, 2 pounds, 12 ounces.

In the next tests the conditions were similar to the preceding, only that the cavities instead of being smooth with sloping walls, were deeply undercut. Harvard pulverized: 8½, 9, 11, 15¾, 7, 6, 13, 14, and 18 pounds respectively. General average, 11 pounds, 6 ounces. Ames inlay: 14, 10, 13½, 7½, 7, 17, 11, 13, and 17½ pounds respectively. General average, 12 pounds, 10 ounces.

In the last two tests the same methods were used as in 5 and 6, only the fillings were deeply undercut, so as to resemble small collar buttons, without the slightest attempt being made to fit the cavity except at the margin, and the cavities were more deeply undercut to make as great a cement mass around the filling as possible. Following are the results: Harvard pulverized: 32, 25, 24, 23, 20, 18, 28, 30, and 27 pounds respectively. General average, 25 pounds, 7 ounces. Ames inlay: 18, 20, 17½, 10½, 17½, 33, 26, and 21 pounds respectively. General average, 19 pounds.

Conclusions.

These tests and tables indicate (1) that glazed or ground porcelain with smooth ivory have but little power of adhesion for cement. (2) They show that a thin film of cement is not so strong a bond as a thick mass. (3) The edges of a filling and cavity should be in as close apposition as possible, but wherever feasible the cement that holds the filling in the cavity should have body. (4) Etching of porcelain with hydrofluoric acid is a valuable means of obtaining adhesion of porcelain with cement on flat, shallow fillings; yet undercuts are to be preferred where they can be obtained, and there is good reason to believe that the best results can be gained by both undercutting and etching the filling. (5) Fusion of zinc oxid to the porcelain inlay for adhesion purposes is unreliable and not so trustworthy as etching. (6) Fineness of grit in a cement is more responsible for a fine cement line than pressure. (7) Reduction of the grit in Harvard cement adds to the strength and power

of adhesion. This is a law that may apply to all cements if they are not thereby made to set too quickly. (8) Maintaining the pressure of setting Harvard pulverized cement after one minute slightly diminishes the cement line and increases the adhesion 24 per cent. (9) The cement line of the Harvard cement ordinarily used in inlay work is from 1½ to 2½ times the thickness of platinum inlay foil, 0.001 in. in thickness. (10) Harvard cement grit may be so pulverized that it readily gives a cement line just the thickness of No. 30 gold foil, while its strength and adhesiveness are greatly increased. (11) The flat adhesive tests show such variety of stress that undercuts should be used wherever possible. (12) Where the inlay and cavity are sufficiently deep to allow the final expansion of the cement during crystallization to be exerted on the filling and cavity, maintaining the pressure is only valuable for the sake of apposition, as more pressure is probably obtained by the crystallization of the cement than can be exerted by external pressure.

This is shown in the filling tests, where external pressure was maintained for but one minute, and yet much greater retention was had than in any of the flat tests.

For the sake of apposition these tests seem to prove that the maintenance of the pressure for one minute is ample. Still, it is a safe precaution to continue the pressure until setting is complete wherever this is feasible.

Having dealt with the question of fineness of film and adhesiveness and strength of cement, the relative solubility of a coarse or a fine line is still to be determined.

These tests are now in progress but are not sufficiently numerous to be conclusive. Still, it may be of interest to state that in the tests already made, fine lines of Harvard cement were attacked by a 1 per cent. aqueous solution of lactic acid in two or three days, while they were not attacked by a 1 per cent. lactic acid solution of saliva during the same time. This apparently shows that the mucus gets into the fine line and acts as a capillary plug, preventing the constant interchange of the solvent fluid.

TUBE TEETH, AND THEIR MODERN APPLICATIONS.

By Mons. B. PLATSCHICK, Paris, France.

(Read before Section VIII, Fourth International Dental Congress, St. Louis, Mo., September 1, 1904.)

EVERY time that I have undertaken the study of the history of dental prosthesis I have been surprised to see that one of the most fertile inventions of our specialty, tube teeth, have not found a greater field for application in practice either in Europe or in America. America was in ignorance of this method for more than fifty years. Harris' "Principles and Practice of Dentistry" contains but two pages and Litch's textbook hardly ten lines on this subject. It was only at the time of the World's Columbian Dental Congress, held in Chicago in 1893, that Dr. Girdwood of Scotland gave some valuable suggestions. Yet notwithstanding this remarkable communication, the literature on tube teeth is very limited. The articles published occasionally in reviews and such standard treatises as Essig's, Richardson's, etc., merely quote Dr. Girdwood's suggestions, and the work of the last mentioned is only fundamental. It is due to this lack of knowledge relative to the use of tube teeth in the practice and theory of pros-

thesis that I thought it would be interesting to address you these few notes and to call your attention to this old-fashioned method which is worthy of resuming its place in the laboratory. In fact, is the abandonment of this procedure since 1837,* as if it were worthless and incompatible with the modern progress of prosthesis, justifiable? Cannot new and artistic results be obtained by the use of tube teeth in combination with the latest scientific invention? These are the questions I shall endeavor to answer.

The abandonment of tube teeth is not justifiable, but is explained by a study of the evolution of prosthesis in the last fifty years. Rubber—a new invention—opposed the development of this method almost at its beginning. Everyone may have had an opportunity of observing in some historic collection the first "terro-metallic" teeth of Fonzi. Compared with those manufactured today they are simply horrible, being badly carved, dull, and black. They possess features which destroy their purpose of imitating the natural organs. Successive improvements finally placed at our disposal teeth that were certainly superior to Fonzi's from the standpoint of the quality of the porcelain and from an esthetic point of view; but all have continued, as is the case with those of today, to present the defects due to the pins inserted in the body of the teeth, whereby the resistance to shock has been diminished. The bicuspids and molars for metal plates have the same crude form, with a narrow masticating surface. The invention of tube teeth in 1837 remedied in an admirable manner all the defects of pin teeth. At last we had front teeth and, above all, molars that from the point of view of form and resistance possessed a real superiority over all those hitherto produced. There were to be no more horrible teeth—non-anatomical, fragile, breaking under the slightest force of mastication—in short, we now have perfect teeth approximating in form the natural teeth and strong enough for all uses.

It is interesting to know that at the time of the appearance of tube teeth they presented another timely advantage, namely, that of replacing those made of hippopotamus ivory. Even in the case of considerable absorption the shape of the neck portion of the tube tooth could be made to replace the absent tissues. Later on, before the use of vulcanite had become general, the upper portions of these teeth were notched and a little gutta-percha was inserted to represent the gum; but often the row of teeth was left untouched, as the exaggerated length could be hidden by the beard or lips. In view of these advantages tube teeth found at once extraordinary favor with prosthetic dentists.

I am sure that many of you have had occasion to use full sets made with tube teeth mounted upon a metallic base, without any other substance to take the place of the absorbed tissue. These full sets, with springs and tube teeth, were then in frequent use. The pin tooth was dethroned and the tube tooth earned its place throughout Europe.

Some time after their invention, tube teeth were in general use in France, Germany, Spain, and Italy, and particularly in England—the land of their birth. It is surprising that America did not adopt the method so universal in Europe, and it is astonishing that the Atlantic should limit its spread to the confines of Europe precisely at a time when relations rich in results between the old and the new world were becoming closer.

We are justified in believing, although literature gives no evidence, that this novelty of all others ought to have been placed within the reach of the American dentist; and although some voices, not impartial perhaps, attribute this to their English origin, the reason has appeared insufficient to me, and I am desirous that American dentists clear up this historic point. Although the date of first manufacture is remote, I was inclined to think that Americans, preferring teeth of their own manufacture, for reasons which I

* According to the details furnished by the firm of Ash & Sons, Claudius Ash, founder of that house, manufactured for the first time tube teeth with a gold sheath. We have analyzed the metal of these sheaths with the following result: Gold, 9.32 per cent.; silver, 8 per cent.; platina, 52 per cent.; other metals, 8 per cent.

shall not go into in this paper, did not wish to use the English teeth, and were therefore forced to renounce the tube teeth, being restrained from manufacturing them in America on account of patents. Particulars obtained from Ash lead me to believe that such was not the case, as this firm say that patents were never taken out on the tube teeth.

The introduction of vulcanite in dental prosthesis dealt tube teeth their death-blow. Winderling's invention stopped the development of the method introduced by the Ash firm. The novelty of the new substance forced all other less useful inventions into oblivion, mainly by reason of its ease of manufacture and cheapness of production. Vulcanite once discovered, everybody used it in every possible case. Metal plates became rare and were substituted entirely by vulcanite plates. Let us add that the improvements in porcelain teeth introduced at about that time contributed largely to this. Tube teeth, even in cases of extensive absorption, were considered useless inasmuch as rubber would substitute the missing parts to better advantage.

For these reasons many metal plates were substituted by rubber plates, and tube teeth continued to be less used and were even abandoned in cases in which their use might have been preferable. It was a pity. No one could reasonably question this class of work from the esthetic and hygienic point of view, as well as its strength and ease of replacement. I do not insist upon their value; the experience of this honorable assembly obviates the necessity of entering into a more detailed exposition of the subject. I shall confine myself to reminding you that the opinion of writers is unanimous upon the advantages of tube teeth, and that the few faults attributed to them may be easily overcome. Let us now determine whether the reasons which prevented the propagation of the use of tube teeth still exist, or whether they have been modified, and if there is still room for the method in the present condition of dental prosthesis.

We shall see that if rubber was detrimental to its development on the one hand, on the other the continuous progress in dental prosthesis facilitates the renaissance of that method by entirely modern applications. Conditions have changed vastly in the last fifty years; prosthesis has become of more general use. If the progress of operative dentistry permits us to save a great many teeth which formerly were sacrificed, that of dental prosthesis permits us to replace better than formerly the masticating organs of persons who have lost them through age or in spite of the services of the dentist. These conditions, united with the general culture of a more enlightened public, can tend only to increase the number of prosthetic appliances. The tube tooth finds itself, on account of very favorable conditions, suited to a large field of usefulness in prosthesis. The difficulties in its use should not be taken into consideration inasmuch as they have been exaggerated, and besides may be overcome by that knowledge which is the result of familiarity with their use. Habit eventually renders the most difficult manipulation quite easy. Although matters of commercialism should not be alluded to in an assembly where scientific questions are discussed, I think it necessary in order to study the subject in all its phases, to say one word regarding its economy. While the tube tooth now costs double the price of the pin tooth, I am convinced that were manufacturers to lower the price to that of other teeth they would be working to their own interest, to ours, and to that of the public. In my opinion, this is a very important point. The profit on a piece of work should not be considered, and only the experience of several years of labor should influence the price. Still more, the unwillingness of dental depots and of dentists themselves to carry a considerable stock of materials, the purchase value of which is far superior to the intrinsic value, should be taken into consideration. I trust that the manufacturers will agree with my views, and thus earn the gratitude of the dentists.

In regard to this, I beg to mention an idea which I believe the manufacturers could utilize. It consists in the use of a

nickel alloy similar to that used for some time in a certain kind of pin tooth. It does not enter into the theme of my paper to discuss the advantages or conveniences of this new invention, but I believe that it would be of service to us when applied to tube teeth. Laboratory experiments have confirmed the fact that a nickel or gold post attached with sulfur in a nickel sheath would hold just as well if not better than in a platinum sheath. Theoretically, there is no objection on the ground of any chemical change that tube teeth with nickel sheath might undergo in the mouth, the sulfur playing the rôle, as it did with the former teeth, of a filling, and the oral fluid could not thus penetrate between the two metallic parts.

I shall not further insist upon the different methods of employment of tube teeth, nor repeat their manifold advantages. Neither shall I linger to refute the unusual disadvantages which are found only by those who have erred in trying to apply them in all cases without distinction. But the resolution I formulated, and which was adopted in the Congress of 1900, encourages me to urge the return to the use of tube teeth in continuous gum dentures, their employment for this purpose being the object of my communication to the congress. I am forced to treat the matter in a complete way and will try and make it as short as possible.

But few of our colleagues here present had opportunity to admire the first application of continuous gum for tube teeth made by M. Feuvrier at the Exposition of l'Ecole dentaire de Paris in 1889, and probably few of you know of his communication presented by our lamented Dubois to the Société d'Odontologie de Paris May 7, 1889. It is therefore indispensable to a thorough understanding of my work to recall in a few words that first and brilliant essay. M. Feuvrier prepared his plate with the usual rim employed in continuous gum work. The teeth were adjusted and the pin soldered as for an ordinary piece. After having determined the position of the teeth and finished their adjustment they were withdrawn from the pins, and soft platinum rings were placed around their necks, and when they had been replaced the rings were duly soldered. The teeth were then replaced in order to be absolutely sure that none was out of alignment and that the setting was still perfect. Nothing further is necessary except the placing of the body and enamel, and subsequent baking. After the teeth have been removed, when the baking is finished, they have only to be cemented in place. I need only mention that what started Feuvrier on the right road in his technique was his desire to make a continuous gum plate superior to all others obtained by the use of the old-style teeth; and also the impossibility of leaving the teeth on the plate during the baking of the Allen body, as they would have fused during this procedure. At this time this was the only way that could be employed by the practitioner who was in love with his art and was desirous of making a continuous gum denture with tube teeth. Today Feuvrier's method is the only one available when using Allen's body or others similar to it. But for some years past the manufacturers have furnished us with a tooth body which enables us to employ tube teeth in a simpler way than that of Feuvrier. It is precisely this method that I desire to describe in a few lines, taking as an example a full upper plate. It is well to note that this same method may be employed with partial upper and lower plates. Still, before describing the technique of the making of the plate, a little digression is necessary to throw some light upon one important point. For this kind of work, the platinum tube in the tooth is entirely unnecessary.

Recognizing the value of a tube tooth without the tube, my colleagues at the congress of 1900, passed the following resolution that I had the honor to present: "That the manufacturers should make teeth of the form of natural teeth with a canal extending longitudinally through them as in the tube tooth, but omitting the platinum tube. These teeth should have in addition to the neck, a large portion representing the root. These permit the construction of continuous gum plate—very pretty, prac-

tical, economic, and not so heavy as those made with any other teeth."*

It is my duty to state that Mr. Cunningham had already theoretically de-

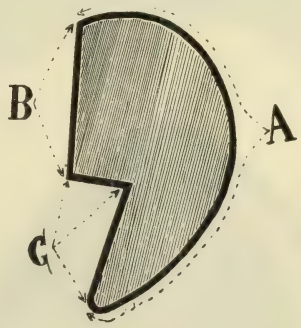
Fig. 1.



vised this tube in 1890 at the annual meeting of the British Dental Association. That suggestion has not as yet had its merited success; but I do not despair, and I believe that the American manufacturers will not delay entering this field which is so full of promise, and will give us teeth which outside of their other qualities will permit us to employ the high-fusing bodies, of which I am an ardent advocate.

To resume the description of the plate: A platinum plate of the desired size is swaged up as usual. Then swage a narrow plate covering the first only where the pins are to be soldered. The plate is then tried in, which is done with a view of ascertaining in the mouth itself where the plate should be cut to give free play

Fig. 2.



to the muscles of the cheek and the frenum of the lip. Solder all along the buccal and labial margins of the plate a wire of special form, that obtained from a draw-plate (Fig. 1) made for the purpose. As you see, the wire (Fig. 2) presents, first, a convex part, *A*, on the external side in contact with the cheek or lip; second, on the internal side the half, *B*, slightly flattened and destined to be soldered to the extremity of the plate; third, a groove part, *C*, that has the same function as a turned rim; that is to say, to receive and maintain the margins of the porcelain (Fig. 3). The next figure (Fig. 4) shows the cut of the plate, the wire being soldered. It is unnecessary to insist upon the advantages of this wire, which can be of any given diameter by reason of the use of the special draw-plate. Besides forming the border this wire serves to rein-

* Proceedings of the Third International Dental Congress, vol. i, page 424.

force the plate, and it likewise permits any adjustment that might be necessary notwithstanding the careful trial of the plate. This adjustment is impossible with a plate with a turned rim, which in addition could not have been tested in the mouth.

Fig. 3.



Fig. 4.



The teeth are then adjusted roughly on the plate. I say roughly advisedly, as a careful adjustment would mean a loss of time. As the small interstices between the teeth and the plate would be easily filled with body and baked at the same time with the body, that will serve to fill the holes in the tube teeth on the masticating side. The teeth having been adjusted to the plate with wax to maintain them in alignment, a plaster wall is made over the external surface, and after the wax is removed the teeth are replaced, which, thanks to the plaster wall, are held in correct position, and you may with a sharp point mark the place to which the pins are to be soldered. After soldering the pins (Fig. 5) and after all due pre-

Fig. 5.



caution to free the plate of plaster and to clean it and the teeth, begin to apply the body. (Fig. 6.) The pins should be slightly painted with the porcelain body and a small quantity placed at the base.

Fig. 6.



This will serve to fill the gaps left by the rough adjustment. The teeth are then slipped on the pins, which have been left a little short so that they cannot be seen on the masticating surface, which will be filled anyhow with a small amount of

Fig. 7.



porcelain as said above. One or two bakings will definitely fix the teeth to their places, establish perfect contact with the plate and, finally, fill the hole in the surface. We have nothing further to do except to apply body and enamel as for other continuous gum plates. (Fig. 7.) The lingual side of the plate may be covered or not, as you choose, although it

is useless in most cases. In this way you obtain a plate which answers all esthetic requirements and which besides having all the good qualities of continuous gum work is much lighter, of much simpler execution, and lends itself to greater ease of repair.

If this new application of tube teeth is capable of interesting the eminent colleagues forming part of this congress, I am sure it will succeed in convincing the manufacturers of teeth that they should work for the progress of our profession.

DENTISTRY TODAY.

By SAFFORD G. PERRY, D.D.S., New York, N. Y.

(Read before the thirty-seventh annual meeting of the New York State Dental Society, at Albany, New York, May 12, 1905.)

TO fully appreciate the scope and significance of any calling we must consider it in its relation to other specialized callings. If we would take a broad and comprehensive view we should, in fact, think of it in its relation to the sum total of acquired knowledge. To attain a vivid sense of its real significance we must go even further back and trace its development from its earliest beginning, and by the help of the imagination strive to appreciate the conditions before it existed at all.

Human knowledge once acquired becomes like a concrete fact, a real possession, and yet it is only relative, for we cannot forget that there was a time when it did not exist. Boast as we may of the riches of human acquirement, in an imaginative mind there must always linger the memory of the poverty of man's early attainments.

What we call civilization always suggests what the primal man knew, as barbarism. It is only by making a mental contrast of these two conditions that the real value of all knowledge becomes apparent. Were I a painter or sculptor I would give my life to the task of depicting two great subjects—the barbarian, and the civilian. The barbarian, ignorant of the components of the air he breathed, the chemistry of the food he ate, the structure of his own body, and groping amid the mysteries of his environment—the unknown universe—yet possessing within, the germs of an illimitable development. On the other hand, the civilian, with upturned face and glances that pierce the very heavens, radiant with intuition of the stars and even of God himself—features calm with a knowledge of his own body and its environment, and benign from power to help, and comfort, and uplift those of his own kind. The whole range of what we call civilization would be suggested by these two extremes.

In the world of art there is nothing so effective as varied contrast. One must look back down the centuries to appreciate the unspeakable advantages of the present moment in man's development. One must make this retrospect in order to fully realize the great utility and the great beauty of this latest art we call dentistry. It is only by such a vivid contrast that we can startle ourselves into a frame of mind to fully appreciate the importance of our calling as a means of ministering to man's comfort and to his advancement. And this brings me to my theme of "Dentistry Today."

When we please ourselves with thoughts of a future life, logic compels us to remember our past life. I cannot discuss dentistry today without considering it yesterday, and tomorrow. Like civiliza-

tion, its great gain for us and its great beauty as an art will not be fully discovered until we make vivid the period when it did not exist.

Civilization has progressed slowly. It is a long step from the tadpole to Adam, and a long one from Adam to Emerson. Dentistry has evolved rapidly. It is but a trifle over a century from the clattering substitutes for teeth of George Washington to the steadfast, almost real ones, made from the Jenkins prosthetic body. With such defective means for articulation no wonder the Father of his Country could not tell a lie! And how easy for the Son of his Country, Theodore Roosevelt, to tell the truth! Besides making the modern man more comfortable, our profession aids in making him truthful.

If we are amazed at the rapid development of our art, we are still more amazed that it should have developed so late. As we search among the ruins and relics of long-forgotten civilizations we marvel at the advancement made by man in the arts, and even the sciences, thousands of years ago, and yet we marvel still more that in periods that could produce such sculptures, such architecture, and such examples of the allied arts, we should find no unmistakable evidences of an advanced knowledge of the dental art. The only natural explanation that comes to our minds is that the need had not yet arisen—that the human teeth were so well developed and the conditions of life were so simple that the dental organs had not yet acquired the habit of decay. Had there been need it would seem that human hands cunning enough to bring into existence the Venus de Milo or the figurines of Tanagra, and steady enough to lay the foundations of the pyramids of Egypt and the temples of Luxor, would find but child's-play in the dental work we do today.

To realize the delay in the development of the dental art we must come down the ages and note the discoveries and great events that have shaped human destiny. It is a curious thing in human history that the development of art in Egypt and Greece should be so early, and therefore so remote, and the discoveries and inventions that have so changed the modern world should be so late, and therefore so near.

Think of the condition of man before he learned to make a fire, the beginning, it has been said, of all civilization; before he discovered how to make glass and, in more recent times, how to protect himself from the elements with waterproof clothing. Before the year 1628 he did not even understand the circulation of his own blood. He did not know how to make spectacles until the thirteenth century. Think of his utter helplessness before that date! No wonder the old manuscripts and missals were all written in such large letters. It was not until 1420—seventy-two years before this country was discovered—that he knew how to print a book! He did not understand the law of gravitation until it was demonstrated by Newton in 1684, and not until about that time did he have the telescope and the microscope. Before that date he had no accurate knowledge of the heavens and none of the intimate tissues of his own body. He has had the steam-engine only since the close of the last century, the ocean steamship since 1815, the railway since 1825, the electric telegraph since 1835, the telephone since 1875. He has had the Roentgen ray only since 1895, wireless telegraphy only since 1899. The germ theory of disease, the great cornerstone of modern surgery, was not applied in surgical practice till Lister's time, and was first used on the battlefield as late as the Franco-Prussian war. Today man's stomach can be cut out and thrown away with the chance that he may live, and with the certainty, at least, that he can have no more indigestion.

By the aid of the antiseptic treatment, surgeons today fumble about in the peritoneal cavity looking for this or that, with no more concern than when searching the eye for a cinder or an insect.

Taking a broad view of man's advancement, one is amazed at his attainments in the last century. New inventions and new discoveries come in such an increasing ratio that we are staggered, and won-

der if he is not nearing a great climax when there shall be a "wreck of matter and a crash of worlds." And yet a serener view will show that out of the intensity and complexity of his activities is evolving a saner and safer condition, and that the powers of the earth and air are being chained to do his bidding and to add to his comfort, while lifting him to a higher plane and making him more than ever master of his environment. And in this splendid procession of events, moving with such irresistible force, our profession takes its honored place, proud of its share in the world's betterment and sure of its position as long as humanity exists.

What is this new art we call dentistry? Let us analyze it and see if we can understand it a little better, and if we can place it in its just relation to the other arts and sciences that have grown up with or before it. In the strict sense of the term we cannot say it is a necessity. I presume no one would call it a luxury while cringing beneath the excavator. It is not a necessity, because long before it was ever dreamed of men lived long, useful, and happy lives. Homer was blind and he may have been toothless. No one ever thinks if Plato had to "gum it" in old age. Shakespeare may have lost his centrals, and perhaps a lateral, but it did not prevent him from writing "Hamlet." It is pretty certain that what teeth he had left were not tobacco stained, for tobacco was not known in England in his day. It is said there is no mention of tobacco in his works. Mary, Queen of Scots, may have had a dead and discolored central, which, though a queen, she had to put up with, for the art of bleaching dermal appendages—either teeth, hair, or nails —had not yet been learned. Yet such a blemish would not have lessened the sympathy that all the world feels for her. Queen Elizabeth's teeth may have been as irregular as her life, yet she always had her imperious way.

Had dentistry been a real necessity it is fair to say it would have developed earlier. Man has been so changed by civilization, and has developed so many needs, that he has surrounded himself with a network of necessities that are as real and as potent as the primal ones that control his very existence. Pictures, sculptures, and allied works of art are not necessary to his existence, but they are necessary to his happiness. Teeth, natural or artificial, are not necessary to man's actual existence, but they are necessary to his comfort; and since the modern man is so imperious, and will have whatever adds to his comfort, our profession is founded on a need that has become universal and will last as long as man in his present state exists. The true mission of the dentist, then, is to conserve and comfort. He is not concerned with the great issues of life and death. He is not concerned with man's intellectual, or moral, or religious development, or with his material prosperity. It is his business to minister to his health and comfort, and to his esthetic adornment. It is a calling, then, that has large scope, and should bring great satisfaction to one who believes in and loves humanity. To one who was born with or who has acquired a desire to be useful in this world and to leave it better than he found it, it gives unbounded opportunity.

This is a long and perhaps unnecessary preliminary, but my desire is to find an effective point of view. I do not want to consider dentistry as a profession of dull routine. By tracing its development in this way I hope we shall all feel a little more keenly its present value to humanity and have a fuller appreciation of its future possibilities. It is always interesting to study the history of man's efforts and activities along the borderland of the unknown. Long before he has actually found a new fact he guesses he has found one. As the good fortune of discovering new facts comes to but few, many spend their lives in guessing. And it is doubtful if it often happens that the man who discovers a new fact fully appreciates its importance. It is safe to say that the man who first baked porcelain in the form of teeth did not realize the importance of his application of the ceramic art.

It is doubtful if Dr. Spooner ever dreamed even of the good that was to

follow his discovery of the power of arsenic to safely kill the exposed dental pulp. It is certain that Dr. Wells never appreciated the great blessing to the race of his discovery of anesthesia. It is certain that he did not, for no man could have the imagination to comprehend the epoch-making character of that discovery. It could only be adequately appreciated by succeeding generations.

And so with the men who made minor contributions to our art, as the discovery of the cohesive property of gold, the filling of root-canals, the rubber dam, and the application of mechanical force with the dental engine and the dental plugger. The discovery of the cohesive property of gold is within the memory of some of us, the discovery of the rubber dam of many of us, and the porcelain filling of all of us. In our delight with this last, we are too absorbed to ask what next? And yet, logic is so inexorable that we know there will be new facts for us, and we strive to guess where in the unknown they will be found. Perhaps the next discovery will be a plastic filling which shall have the adaptability of the oxyphosphate, with a durability not yet attained or even dreamed of. And so with the expectancy of children, we work, and wait, and hope.

The real significance of any contribution to our profession can only be known in retrospect. Beautiful as are the porcelain fillings of today, their real value will not be known until years have passed away. It is sometimes said by those who have a touch of pessimism in the blood, that on its mechanical side our profession has made no progress since the time, twenty or thirty years ago, when the contour filling was the new thing, and when gold as a filling material was more extensively used. At first glance, it must be admitted there are some facts that seem to sustain that view. The rubber dam, the separator, and the electric and mechanical mallets made it possible twenty-five years ago to do as perfect and as permanent work as ever was, or probably ever will be, done. But it was work that was done at fearful strain upon the patient and the operator. It would, however, be shutting our eyes to the facts of progress to contend that we have not made advances since then. In fact, with no knowledge of what has been done since that time, we might assume, on the strength of our faith in the general law of evolution, that we have made progress. If we give way a little to the optimism which is inherent in all hopeful and enthusiastic natures, and look about us, we shall see that we have made enormous progress in every department of our profession. Let me point out some of the advantages in the practice of today. Before discussing filling materials or methods, let me allude to a subject that is fundamental, and one that I consider is the cornerstone of all correct dental practice. I refer to the matter of contour. So far as I know, throughout the world today there is a general acceptance of the correctness of the principle of the restoration of the shapes of the teeth. Thirty years ago that method was practiced by only a few. From the time of Dr. Varney, who first set the pattern for that practice, to the present day I have been a persistent advocate of it, and my convictions on the subject are so strong today that I must place the fact of its universal acceptance as an unassailable gain, and one that for some reasons I consider the most important of all. Accepting nature as our guide, as all workers in science and art must do, it was from the first a foregone conclusion that we could never stop in our striving for perfection in our art until we had adopted the shape of the perfect tooth as our model in the shaping of our fillings.

As we look back over the last half-century it is appalling to note the havoc that has been wrought in the human mouth by the reckless disregard of the shapes of the teeth. The way is strewn by wrecks and ruins that should be a reproach to us if we did not know that by such means only could we force our way from the childish region of darkness and ignorance out into the light of the practice of the present day. Men are but children when they face the unknown, and in the early days the making of contour fillings was impossible and unknown, partly because the means for such work had not yet been

found and partly because the conscience of the profession had not been aroused to that point. Today the means are in the hands of the profession throughout the world, and the professional conscience has been quickened, and never again can the shapes of the teeth be disregarded by those who aim to keep in the front ranks of modern practice.

What have we gained by experience in the matter of the selection of filling material? We have liberated ourselves from the unreason and the tyranny of the idea of the universal use of gold. We are quick to acknowledge that in a certain class of cases it is the best material yet discovered, but we have grown tolerant of other materials, and adopt them as never before, without fear of condemnation.

We have learned that our first duty is to save the human teeth, and that the way in which we do it is of secondary importance. We have outgrown the idea that most cavities, large and small, must be filled with gold if we are to escape disgrace before the bar of professional public opinion. We have been awakened to the idea that it is our duty to nurse the teeth, and we have learned that many very small cavities on approximal or sheltered surfaces can be nipped in the bud by preparing them with very small burs, or very tiny excavators, and filling them with a good grade of gutta-percha. We are beginning to realize that a cavity in a tooth is a reservoir for acids and germs, and if its orifice is sheltered a very soft substance like gutta-percha is the very best material it can be filled with.

Such fillings can be placed in a few moments, with little pain and without destroying the contour of the teeth, and with the certainty of lasting several years. For the soft teeth of childhood and the senile teeth of old age we have found this the best practice. Some day later, even for the young that may be best; but let us wait until that "some day" comes. For the old it will never come.

The tiny fissures in the crowns of the teeth of the young we have learned to cut out with a minim bur, or a tiny excavator, and calk with tin foil, or with oxyphosphate, with the certainty of the teeth being safe for many years. When adult life is reached these teeth will be so hard that the same cavities can be calked with gold in such a manner as to last for life and with the certainty of making smaller fillings than if filled at first with gold. We have learned to treat very large cavities in such a manner as to get a better result than by filling them throughout with gold. We can fill them partially with oxyphosphate or amalgam, and veneer them with gold and attain the best results yet known.

Liberated from the tyranny of professional public opinion, we smile when we recall the days when the amalgam war was on and men were debarred from society and association who ventured to use the "nasty stuff," as it was then called. We have outgrown the intolerance that is a human trait almost invariably manifested in the early stages of any new acquirement of knowledge. We have also outgrown the idea that the human mouth is the proper place in which to make a display of artistic work solely to show what can be done.

It is pre-eminently the place for artistic work, for such work should be more durable, but it is not the place for the exhibition of human skill for the sole purpose of showing what can be done by ingenious hands. There are considerations that come before those of art and skill. The security and comfort of the patient is of more importance than the legerdemain of the operator, and large and trying operations are only justifiable as they secure comfort and permanence for the patient. The operator who is concerned solely with a display of his dexterity, with little or no thought of the good of the patient, should cut or carve on wood or marble, or any inanimate substance, rather than on the living tissues of the human mouth.

In the field of plastics it must be admitted that in the last quarter of a century the gain has not been as great as could be desired. Occasionally we hear it said that our gutta-percha is no better than that used twenty-five years ago. In fact, there is a tradition among the older

operators that none has been made in recent years equal to Bevan's. But in those early days the tests were not as exacting as at the present time, and it is safe to say that our best preparations are at least as good as any ever made or used. But they are probably no better, for the material has physical and inherent limitations that must ever exist. Yet when considered in relation to its large usefulness gutta-percha is an inestimable blessing—a veritable boon to the human race. We are so accustomed to its gentle ministrations that, like the dew, its beneficence is overlooked. In the hands of the accurate or the inaccurate operator it is almost equally successful, and it stands at the gateway of decay an ever-faithful guardian. No matter how well-looking its surface, it will be sound and wholesome underneath, and no matter how worn and unsightly, it will be still the same where it is most needed, at the bottom of the cavity or along the cervical border. It is a priceless blessing at both ends of life, in the rapid decay of childhood and in the senile decay of old age.

A long step forward was taken when the oxyphosphate took the place of the zinc oxychlorid. As a filling material it is greatly improved today. A better knowledge of it chemically would insure that. But it also has its limitations, and it may be that they have been reached at the present time.

It is hard to say what has been gained in the matter of amalgam. There are those who think that the last half of the century has seen no gain in its composition and its preparation. But such an assumption would not be in accordance with the law of progress, and as in the case of the zinc compounds, it is safe to say there have been improvements all along the line. In addition, there is greater discrimination in its use, so that instead of being condemned and rejected, as it was likely to be at one time in our history, it is now one of our most important materials. The day has gone by when anyone can boast of superiority as an operator because of its rejection. If we are to be judged by the benefits we can confer upon our patients we must use the "nasty stuff." Used for the restoration of contours its value is far more than enough to compensate for its inherent defects as a filling material.

Tin remains and must ever remain a valuable filling material, but its range of application is very narrow, being confined almost entirely to the tiny fissures in the occlusal surfaces of the teeth. The years whirl by with increasing speed, and yet the tiny tin fillings placed in those little fissures are still found calking the cavities as no other material is likely to do. And what old-fashioned joy in the feeling of it under the instrument!

During all the long years when we have been ringing the changes on the qualities of these different filling materials, there has been and is still a strong feeling, sometimes expressed, that not even yet have we found the perfect filling material. We have called into the unknown and have gotten no response. Sometimes we have seemed to hear a faint echo, but never a clear answer to our call. We have pleased ourselves by guessing from what material would come the next improvement. Naturally, we have thought it would be in the line of the phosphate cements. And it may be that even yet that material may hold secrets that will be of great value to us.

The greatest improvement has come to us from an unexpected source. The first fused porcelain filling came like a flash, illuminating the new way we are to tread and making the future brilliant with promise. What a thrill shot through us as we first grasped a clear conception of its full significance! With lightning-like quickness we appreciated its possibilities, and looking beyond our early botch efforts and first failures saw the shining mountain of our satisfied desire —the accomplishment, at last, of almost perfect work in the human mouth.

This new porcelain filling is the crowning glory of the dentistry of today. It makes more certain the claim that our profession is one of art, as well as one of science. If heretofore we have deserved the world's gratitude for conferring comfort and security against the destructive forces of nature, how much more shall we

deserve it by securing in addition, grace, and comeliness, and that indefinable something we call beauty! The time is not far distant when no more shall be seen those glittering headlights of dental art, the gold tooth and its consort the gold filling. Consigned to the limbo of forgetfulness will be those symbols of barbaric vulgarity, and along with them will go for all exposed places their poor relations the plastic fillings of all shapes and hues. As must be expected, we do not even yet appreciate the gain to us from the esthetic side of our work. This must be true, for there are still some operators in high places who do not yet make much use of these porcelain fillings. On the other hand, we are all human, and it must be expected that this new filling will be used by enthusiastic operators in many places, particularly in the back teeth, where our old fillings carefully placed would do better in the long run. This swinging of the pendulum must be expected. It is an outcome of enthusiasm and hope, and helps us on in our progress. By its means we shall acquire greater familiarity with the porcelain filling and shall eventually extend its sphere of usefulness in the back teeth, with saving to patient and operator.

Aside from the great esthetic gain from porcelain fillings there is an advantage technically, because in their use the personal equation is greatly reduced. In the porcelain filling the chance of error or inaccuracy in manipulation is confined to the periphery. With the gold filling, it extends over the whole surface of the cavity. A careless operator may have the luck to make a good peripheral joint with the porcelain, and so may make a good filling. With gold such an operator can never make a good filling under any circumstances. This is so certain that one could almost make a mathematical calculation that would show the relative advantage of the porcelain. For this reason, if for no other, better fillings will be secured to our patients, and in that proportion will our profession be raised in the estimation of the public.

From the esthetic point of view we have reason to believe that we have reached the goal of reasonable ambition. To fill a decayed or broken tooth with porcelain so matched as to defy detection is to reach the limits of human perfection. Where the fillings are in sight we shall never do better than this. Human skill and ingenuity can go no farther. No other profession can go as far as this. In this respect, and without boasting, it can be truly said that we lead the world. For cavities out of sight we may yet find some material that used in plastic form may be lasting, but surely we may never hope that any such material will be found that will match the natural teeth as do those porcelain fillings.

Then we have found in them all that the most enthusiastic dreamer ever hoped for. And it was to emphasize and extol this new achievement that led me to adopt as the subject of this paper the dentistry of today. It is the rounding out of my professional life to be able to stand here and speak in appreciation of this marvelous and never-before-attained union of a beautiful art with an exact and beneficent science. Surely the gods have been good to us, and every one of us should uncover in the presence of such work as our profession is doing today in every civilized land on earth! We should feel a lump in the throat, and choke, at the thought of the beauty of it all! We should shake ourselves out of the humdrum habit of careless observation of these new things, and strive, as was pointed out in the beginning of this paper, to find a new point of view, so that the full significance of all these things shall be apparent to us.

I have spent the greater part of my professional life combating the display of gold in the human mouth, yet I never dreamed that I should live to see the time it could be so effectively done away with. This in itself is satisfaction enough for a lifetime! We should stand on our heads with joy at the privilege of engaging in a life-work that so combines art and science—beauty and utility! If, as Keats said, a thing of beauty is a joy forever, so may it be said that a thing of utility is a blessing forever! I think we have a right to claim that there are no men who

are doing more for man's comfort and happiness than those enrolled in our profession. If this is true, dentistry today has fulfilled its early promise.

I must not forget the surgical side of our profession. The discovery of anesthesia was the great, overshadowing, far-reaching fact of our development. It is now so near, and so everyday, that we overlook and forget its significance. It has banished forever that terror-land of pain that was man's inheritance. We are no longer afraid to live. Our bogie period of childish fear of existence has gone forever. We breathe the nitrous oxid gas and live so rapidly that the delusion of existence renders us unconscious, and when we waken the terror-land has been passed and Paradise is ours. This achievement of our profession, fraught with more beneficent consequences to humanity than any that ever occurred in the history of the world, should sober us and fill us with a profound feeling of reverence and respect for the dentistry of today.

Although the discovery of cocain and its allied remedies cannot be placed to the credit of our profession, it is true that we have made most intelligent and effective use of them. Such remedies once known can never be lost, and anyone, no matter how lacking in imagination, must realize how better equipped we are in having them. It is only a few years that we did not dream that the time was at hand when we could take out a living pulp or a tooth with the patient looking on and wondering why it did not hurt. Sensitive dentin, the last of all living tissues to yield to the quieting influence of drugs, owing to its density, can now be operated on with less pain than ever before, although it must be said that the ideal obtundent has not yet been found.

The application of the principle of asepsis in the surgery of the oral, though not as important and as impressive as in the abdominal cavity, is established forever on a firm foundation. Our intelligent application of it has helped to secure for us from the medical, surgical, and lay world, the recognition that is essential to our existence as a profession. Yet the appreciation of the principle is comparatively new, and belongs to the dentistry of today. I hope I may be pardoned for alluding to the fact that in a paper read before the Odontological Society of New York, January 16, 1883, and published in the April number of the DENTAL COSMOS for that year, I ventured to express the opinion that micro-organisms were the cause of the troubles that arise about the apices of dead teeth, and also mainly the cause of the inflammations that arise about the roots of loosening teeth, and that the antiseptic treatment was the true and logical one. So far as I knew then, or have been able to learn since, that was the first time such an opinion had been publicly expressed, and I was laughed out of court. Today it is safe to say that that principle is accepted and applied in the treatment of the canals and apices of all dead teeth, and it is also extensively applied in the treatment of loosening teeth. If our profession is not yet ready to accept as true the idea that the presence of micro-organisms is the most important factor in the loosening of teeth, I do not for a moment doubt that it must do so in time. In fact, I note that those who oppose that idea still use the antiseptic treatment, which is in itself a proof of the trend of professional opinion. In addition, as a proof of the broad fact of sepsis in the mouth, both in health and disease, note the enormous modern use of antiseptic tooth-powders and washes, and the great gain to our patients thereby. The correct and thorough cleansing of the mouth is modern, and rests upon the fact of the presence of micro-organisms in the mouth in health and in disease.

In the surgery of the mouth we have been as successful as our brothers have been in the surgery of other parts of the body. In diseased conditions of the mouth and gums, if not always successful we are at least as successful as our brothers in medicine are in the treatment of diseases in general. Pyorrhea alveolaris must ever remain our *bête noire*. Mainly caused as I believe by lowered vitality and micro-organisms, we must expect it to be like the poor—always with

us. When we can stop the hair from growing white, and smooth the wrinkles out of the human face—when, in fact, we can stop men and women from growing old, then may we hope to cope successfully with a disease that is essentially one of middle life and old age. A distinguished man on the downward side of life once said to me that he had observed that he got better, but never got well! We can palliate and sometimes partially check pyorrhea alveolaris, but we cannot break up the conditions that produce it, how then can we hope to actually cure it? The word cure is a significant one, and we should be careful how we use it. Yet instead of being depressed at the thought of our impotence in the treatment of this disease we should be encouraged by the fact that in the whole range of our work it is practically the only one we cannot master. How much less than this must be said in medicine.

We have reason to be proud of what can be accomplished in the correction of irregularities of the teeth. It has taken us a long time to truly comprehend the correct principles that underlie this work, but thanks to the earnest men who have given it their best efforts the task is simplified, and it need be no longer the bugbear it was in the early days. To make the human face beautiful—what more worthy effort in the whole range of human activity! Not on canvas, or in marble, but in warm, living flesh and blood.

I have left no time to consider two of the most important factors that have helped to make us what we are today. Nothing more convincing can be said of dental education than to contrast the colleges of today with those of half a century ago. It is easy for us to criticize, and some of us are born to do that, but whether we blame or praise, the fact remains that we have a splendid array of colleges, and that the best men in the profession are teachers in them.

Of our literature it must be said that it has kept pace with our advancement. It must be so, for it is an index of that advancement. A vital profession is sure to have a vital literature. I have but little sympathy with the thought that it depends upon the medium through which it reaches the profession.

It is a man's thought that tells, and we might as well try to dam back Niagara as to modify or suppress the living thought of the men who are earnest enough to make the profession and the literature we are proud of today. Let us take a broad view and be glad to acknowledge the increasing number of men who are vital enough and well enough educated to adorn any literature on earth.

The social as well as professional status of the dentist of today is determined by himself. If he chews tobacco, wears long hair and a slouch hat, does not keep his finger-nails trimmed and cleaned, has no knowledge of literature, of art, and the affairs of the world, he need not complain if he is not well received. If he is an educated gentleman all high places will be open to him.

I have considered the past and the present of dentistry. It now remains for me to add a word in reference to its future. Eternally fixed in the order of the universe is the principle we call evolution. As surely as comes the morning, so surely shall come the time when we shall be different from what we are.

It may be difficult to indicate along what lines we may develop most rapidly, but I shall venture to predict that we shall acquire a keener sense of our responsibilities to our patients, be more strict in our examinations, more alert in the prevention of the diseases of the teeth, and more careful to instruct our patients in their proper care. We shall accept fewer patients, see them oftener, and do even better work than we are doing now.

We will employ young graduates of both sexes to keep the teeth of our patients clean, and to watch and fill for young children fissures and tiny cavities that today are passed by. We shall be more alive to the importance of prophylaxis. It will eventually assume first place in our practice. We shall have more reverence for the natural teeth and shall work upon them with more patient care and to better effect. We shall individually endear ourselves more effectually to

our discerning patients and shall become more necessary to them.

It may be difficult to predict our future relations with medicine and surgery, but whether we become more closely allied as co-workers in the healing art, or drift away as following an independent calling that makes more demands upon art, we shall more than ever be considered professional men, and receive the reward that must ever come to those who have the knowledge and skill to save the human teeth.

We shall employ trained nurses as our attendants at the dental chair. They will always be women, and they will be educated for their special work and be known as dental nurses. They will take charge of our instruments, sterilizing them carefully and keeping them in better order than they are kept at the present time. They will be our constant attendants at the operating chair, and will assist us in all operations in the mouth, and will keep careful chart records of the same. They will give each patient a carefully made chart record of every root-filling, the patient being instructed to keep it for reference while traveling abroad and for future use when a new dentist may be employed. Today some dentists keep a record in their own possession as a means of holding the patient. That practice will be outgrown in the future.

We shall use in the pulp-chambers of all dead teeth, and in the base of all large cavities of living ones, fillings of certain colors to indicate that they are permanent, semi-permanent, or temporary. These colors will be adopted by the profession, and will be understood throughout the world, as plumbers and steam-fitters have a standard screw-thread that is adopted universally. Many years ago Dr. C. A. Francis adopted red base-plate gutta-percha for all pulp-chambers, and crown fillings for teeth the roots of which were not yet permanently filled. If that practice were adopted universally, and it was understood to be uniform, it would be a great convenience everywhere.

In the making and setting of porcelain fillings we shall attain an accuracy not yet dreamed of. We shall have a cement that will hold them permanently, and that will not change their color in the slightest. We shall make joints that we shall be puzzled to see, and that will last indefinitely. We shall wedge teeth more by the slow and painless wedge than by the quick separator. This will be necessary, for porcelain fillings require more space than others. The high standard of work will compel this. We shall also wedge more for gold fillings in order to be sure to make them more perfect. The separator tempts us to work through spaces too narrow for perfect work.

In accepting new patients there will be more formality, and it will be done with a distinct understanding that they are to be sent for at stated times, or when required by the dentist, and when sent for they will come, if the service is to be continued. All children will be seen in time to guard the temporary teeth, not one of which will be extracted prematurely, and all of which will be filled with more care than at the present time. The proper occlusion of the first molars—the lower ones half their width in advance of the upper ones—will be secured at any cost at the time of their eruption. Guided to their places in this way the danger of succeeding irregularities will be greatly lessened. Artificial crowns will be made more of porcelain, and be far stronger than at the present time. They will be set so they can be removed in case of extreme emergency. Bridges, both fixed and removable, will be more carefully made, and porcelain will be used for them more than at the present time. More of the English tube teeth will be used, as they can be easily removed in case of breakage, without removal of the bridge. Artificial teeth will be made by specialists who will consider them works of art, and give more time to them than is given now. Diseases of the mouth and gums will be more intelligently and successfully treated. Even pyorrhea alveolaris, which I have designated as incurable in the strict sense of the word, will be greatly mitigated. Even its cure would not be as wonderful as was the painless extraction of a tooth under nitrous oxid, or the removal of a pulp under cocain.

The younger men will be sure to have more hope in its cure, and that very hope may be an aid.

A harmless and effective obtundent for sensitive dentin will be found, and the discomfort and pain of dental operation will be greatly reduced.

We will be more respected because the rank and file of the profession will be better educated. The higher standard of preliminary examinations exacted in dental education today must produce a higher class of men.

We will be more tolerant and more ethical. As in professional life in Europe today, men of age and experience will be more respected and better treated by the young and inexperienced.

There will be disturbing and discouraging conditions in the future, as today. There will be men who will practice our profession for the money they can make out of it—there will be the dental parlor, the street sign, and the dental show-case. There will also be the semi-respectable men who manage to keep just in the shelter of the profession, and who work it for all it is worth. There will be the drones, the fops, and the sharpers. There will be selfish and unreasonable patients who will tax body and soul, and there will be long hours of work and close confinement, away from God's air and sky. But all of these will not prevail. In spite of them the profession will move on in its destined way, broadening and deepening, and becoming more and more a great branch of the healing art. Its future was never as bright as today. There is no power on earth or in heaven that can or that will deflect or divert it. It is one of God's chosen ways for the betterment of mankind; it is childish to doubt its future. And all of this because it is not founded on shallow pretense, but upon a widespread, everlasting human need.

In conclusion I will add but one sentence. If we fix our minds upon material advancement, as the great object of life, there may not be overmuch to encourage us in the dentistry of today, or even of tomorrow, but if we spiritualize our existence, and find joy in laboring for the good of humanity, and love to protect and comfort those who need, our profession offers a field second to none in the whole range of human activity.

TIN-CEMENT AND SPONGE TIN: TWO NEW FILLING MATERIALS AND THEIR USE IN DENTISTRY.

By Dr. ARTHUR SCHEUER, Teplitz, Bohemia.

(Read before Section VII, Fourth International Dental Congress, St. Louis, Mo., September 1, 1904.)

A YEAR ago I published in the *Oster. Vierteljahresschrift für Zahnheilkunde*—the Austrian dental quarterly—the method of preparation of a material which I called "sponge tin." This material is obtained from a solution of stannum bichloratum (bichlorate of tin by precipitation with zinc). The substances employed must naturally be chemically pure, and the precipitated sponge tin must be washed with running water until, when tested with blue litmus-paper, no trace of acidity is perceptible. This test alone is, however, insufficient; a small piece of sponge tin crushed in the mouth should not leave the slightest acid taste behind.

This result can be obtained after long and thorough washing and boiling. After every particle of moisture has been driven off by means of the drying oven, the sponge tin appears as a gray felt, consisting partly of light, dust-like tin particles, partly of metallic fibers and scales.

Sponge tin may be condensed between the finger-tips, and naturally much more

readily when pressed into a cavity by means of a Solila or a Royce packer. It is of invaluable assistance in gold filling, since it may be mechanically united with, mechanically welded to any brand of unannealed sponge tin whatever.

Into the cavity, which need have no undercuts, I carelessly pack sponge tin nearly to the margin; it is quite the same whether with hand pressure or with the automatic mallet. Upon this I condense a layer of unannealed sponge gold—Watts' or Solila—then a layer of annealed sponge gold, and finish with annealed gold foil or cylinders.

My further experiments have yielded the fact that a tin powder obtained from sponge tin when mixed with annealed zinc oxid produces a cement powder with certain qualities that render it of inestimable value in its application to dentistry. This powder is of a light grayish color, with here and there the shimmer of a fine particle of metallic tin, and may be mixed with any good cement liquid, producing a cement with far greater adhesive properties than that of the ordinary cement powder alone. This may readily be seen from the fact that the ordinary cement when it has hardened upon a metal spatula can be removed with comparative ease, whereas in the case of tin-cement it is accomplished only with the greatest difficulty.

Tin-cement is also quite remarkable for its hardness, as well as for its resistance to the wear due to attrition and to the attack of an acid saliva.

Furthermore, a ground and polished tin-cement filling, with its bright, silver-like surface, resembles a good gold amalgam filling, due to the rotation of one tin particle upon the other in polishing. Since the surface presented is practically of metal, its resistance to wear and to the attack of saliva is readily accounted for. Tin-cement fillings neither lose their own color nor do they discolor the tooth, consequently the usefulness of this material is considerably extended.

A still larger field for the employment of tin-cement is furnished by its quality of entering into intimate mechanical combination with any brand of unannealed sponge gold; and these combination gold fillings are in no particular inferior to the solid gold fillings.

The cavity should be filled nearly to the margin with tin-cement, and in the last stage of its hardening there should be condensed upon it a layer of sponge gold, unannealed, and of any brand whatever; upon this is packed a layer of annealed sponge gold, and the filling is finished with annealed gold cylinders or foil.

All this is done so rapidly that it can be completed in one-third the time required for a solid gold filling of equal size. And how precious is every minute to the busy gold operator, not to mention the saving in the amount of gold used!

If I call your attention further to my method of simplifying gold filling, it is because through its simplicity a faultless margin is rendered possible by the use of the materials here mentioned, especially of the tin-cement.

The cavity is prepared in the same manner as for a porcelain inlay, and the impression taken with No. 30 or 40 gold foil, this being well burnished to the walls of the cavity. Allow the edge to overlap $\frac{1}{4}$ to $\frac{1}{2}$ mm., and burnish carefully. If the foil at the bottom of the cavity is not torn, cut it with an excavator, fold the edges over and burnish to the walls. The bottom of the cavity should then be filled, either with sponge tin or, still better, with tin-cement, by means of which the impression is sufficiently retained in place, and that through a material which combines readily with sponge gold.

The balance of the cavity being completely covered with gold foil, the difficulty of further manipulation and completion of the gold filling is reduced to a minimum.

CORRESPONDENCE.

THE DISAPPEARANCE OF THE THIRD MOLAR.

To the Editor of the Dental Cosmos:

Sir,—While living in the City of Mexico I had an opportunity to acquire from a peon with a liking for grave-digging, five skulls, one at a time, each one being pierced with and still containing a spear-head, four of the spear-heads being of obsidian and one of copper. These skulls, as nearly as I could learn from my bare-footed friend, were exhumed by him from some mounds just outside the city. The spear-head in each skull plainly suggests the finale of life's history of each individual.

The depth of the green rust scales or verdigris on the copper spear-point indicates a long lapse of time since the life of the unfortunate who suffered its penetration, and that all these skulls came from the same mounds points to warfare in which they all suffered at the same time. And that this period might be a remote one seems very possible, from the fact that warfare, murder, or vengeance, carried out with such methods as these skulls suggest, has long since ceased to be popular in the Valley of Mexico.

The maxillary characteristics of the skulls, with their normal arches, together with the regularity and perfect symmetry of teeth, suggest their being of the Indian type of that land. The teeth, too, show the abrasion of a corn-eating people, such as the Mexican Indian is and has been. In no one of these skulls do the teeth exhibit any sign of caries, though they show a waste from abrasive grinding—to a great extent. In two of the four skulls now in my possession there are upper right third molars, with no indication of others ever having been present. In one there is a beautifully formed lower third molar on the right side, with no indication of there ever having been one on the left side. In one other there is the reverse of this, the lower third molar being present on the left side with no indication of there ever having been one on the right side.

It seems plain that these skulls are of the Indian type of the Valley of Mexico; that they were a corn-eating people; that they may have lived and died at the same period—a long time ago; and, what is positive and a fact, that there is no sign of caries, and that they are without the four complete third molars.

Every dentist sees hundreds, even thousands, of cases where the four complete third molars have erupted in the mouths of civilized persons. And, as if to be over-generous, nature often puts in an extra little peg back of one or the other upper third molars, making a fourth molar, as we all have seen. But here, in these Mexican skulls, we have an incomplete condition in a people who, all their lives, used a broken "tortilla" as their only fork and spoon—as they say, "a clean new spoon with every mouthful."

These observations are brought to my mind in reading a paper by Dr. Juan Falero and reported in the Cosmos for May, wherein he surmises that the reason for the disappearance of the third molar is sequential to civilization, stating that the Mexican Indian has his third molars, whereas people who, let us say, use knives and forks and spoons and who cook and season their food, do not. My four skulls would seem to give that theory a severe strain for maintenance.

T. Ledyard Smith.

New York, May 1905.

THE "MAASCH METHOD" OF ATTACHING CROWNS.

To the Editor of the Dental Cosmos:

Sir,—On page 569 of the May Cosmos, Dr. How republishes the Maasch method of attaching crowns, with a date in 1889 as that of publication.

Some eight or ten years before that date the Büttner method was published, and certainly it was criticized by me in the Cosmos as early as 1882. The *beveled* ring I used as early as 1883, and still have my original instruments. Whether there was an earlier method than Büttner's I know not.

John S. Flagg, M.D., D.D.S.
Boston, Mass.

PROCEEDINGS OF SOCIETIES.

FOURTH INTERNATIONAL DENTAL CONGRESS, ST. LOUIS, MO., AUGUST 29 TO SEPTEMBER 3, 1904.

(Continued from page 704.)

SECTION VII: Operative Dentistry—*Continued.*

Chairman—C. N. Johnson, Chicago, Ill.
Secretary—Geo. E. Hunt, Indianapolis, Ind.

The Chairman. The next paper on the program is one by Dr. E. K. Wedelstaedt, St. Paul, Minn., entitled "Gold and Tin," as follows:

Gold and Tin.

In 1884 my attention was called to the use of tin and gold. It was asserted that where the gingival portion of cavities in the approximal surfaces were filled with tin, and gold was used to complete the operation, recurrence of decay would not take place. Fig. 1 illustrates the method used in cavities which were filled in the approximal surfaces of incisors and canines. Fig. 2 illustrates the method used when dealing with similarly situated cavities in bicuspids and molars. For four or five years this method was closely adhered to.

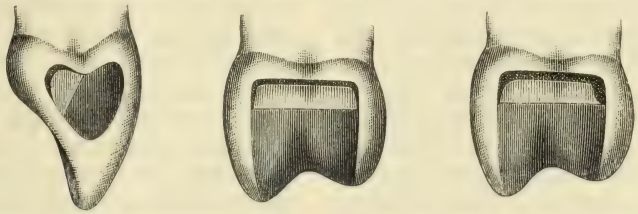
In 1889 my attention was called to gold and tin in combination. It was alleged at the time that greatest benefit resulted from the use of this combination. Gold and tin in combination were used in the same place as the tin.

In 1891 the use of tin, and gold and tin in combination, was discontinued in my office. For seven years prior to this time the gingival third of practically every cavity in the approximal surface which I had filled with gold contained some tin or gold and tin in combination.

For the past ten years so many of my patients have been returning with cavities of decay around the gingival margin, which it was supposed was protected by the tin or the gold and tin in combination, that I felt much trouble might be saved others if attention were called to this subject.

In so far as they relate to the preservation of the human teeth, there is absolutely no virtue in tin or in gold and tin in combination, provided they are used in conjunction with gold as is illustrated in Figs. 1 and 2. On the other hand there is no filling material that has done so much harm and been the direct cause of destroying the life of the pulp and destroying the dentin, in proportion to its use, as tin or gold and tin in combination. I cannot help what others may say in its favor, I say what I do on account of the bitter experience which I have had by making use of these materials.

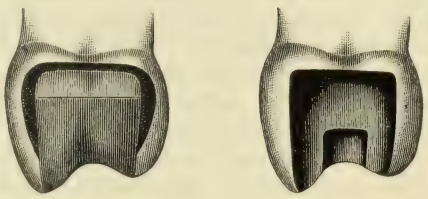
Fig. 1. Fig. 2. Fig. 3.



ARGUMENT.

Where the gingival portion of a cavity in the approximal surface is filled with tin and the operation completed with gold, what results? First, we have a movement in the tin. The tin moves toward the gold and away from the cavo-surface angle of the cavity. (Figs. 2 and 3.) Secondly, with this movement in the tin we have an opening between it and the cavo-surface angle. The moisture enters between the cavo-surface angle and the tin, and an oxidation of the tin takes place. Thirdly, with the oxidation of the tin we have an infiltration of stannic acid into the tissues of the tooth which surround it. This causes the tooth to have the appearance of Fig. 4. Wherever that blackened condition exists, we have dead tissue. Fourthly, if the condition as illustrated in Fig. 4 is left to itself it is but a question of time before the oxidation penetrates to such an extent as to impair the vitality of the tooth. The dentinal fibrils are destroyed. This is followed by the death of the pulp, and the tooth is on this account degenerated; it is then in a fit condition to invite caries. In fact the moment there is the slightest movement in the tin, causing it to draw away from the cavo-surface angle, small particles of food and micro-organisms occupy the space between the filling material and the cavo-surface angle. The greater the movement of the tin, the larger is the ditch which exists along the gingival margin. We all know that wherever there are ditches of this kind we have a condition which invites caries. In my studies of these conditions where tin, or gold and tin in combination, have been used, as is illustrated in Figs. 1 and 2, I have seen all kinds of caries around the gingival margins and in the cavity itself. Indeed, I have seen not only the whole axial wall between the gold and the pulp a mass of softened black decay, but I have seen many cases where the gingival seat and the axial wall had the appearance of Fig. 5.

Fig. 4. Fig. 5.



If this much can be said of the results which follow the use of tin in connection with gold, what can be said of the results which follow the use of gold and tin in combination? All writers who have advanced the use of gold and tin in combination agree on one point, which

it is asserted is in its favor, and that is, its remarkable change of character. In other words, when we first place mats or cylinders of gold and tin into cavities they are very soft. Later on, there is a change in the materials; they become very hard. What is this change? It is purely and simply a crystallization. In the process of crystallization the molecules are drawn more closely together and we have as a result a change of form as well as a change in the character of the material. Wherever there is a crystallization we know that there must be either an expansion or a contraction in the mass. All scientists recognize this as a fact, for it is one of the fundamental principles of chemistry. We know definitely that in the crystallization of gold and tin we have exactly the same conditions existing around the gingival margin as where tin is used in connection with gold. What are some of these conditions? We have an open ditch around the gingival margin, absorption of the gum in the interproximal space, destruction of that portion of the pericementum which is adjacent to that tin or gold and tin in combination—a condition which invites disease, a faulty environment which if left to itself will naturally lead to the destruction of the tooth, etc. The use of materials which bring about such results is not to be considered an aid to the preservation, much less to the salvation, of the human teeth.

We know definitely a number of things, and among these things are two of much importance which are directly connected with the subject under discussion. What results where we take a sheet of No. 4 gold foil and over its surface sprinkle an imperceptible amount of tin? If we lay this sheet of gold between two pieces of paper we shall, on examining it at a later period, find that we have nothing left but a black powder which is a metallic oxid. (I am indebted to Dr. G. V. Black of Chicago for this experiment). The contact of the tin with the gold causes a chemical action to take place which results in our having nothing left but a black powder. This black powder has been called a black oxid of gold. Does any thinking practitioner mean to say that we, as intelligent men in a progressive calling, are justified in using materials which, when placed in cavities in the human teeth, undergo a distinct chemical change? I have answered this question for myself and I leave it for others to do likewise.

The second fact is this. Suppose that the distal surfaces of two upper bicuspids were decayed. It will be supposed that both teeth are normally situated. Suppose when the cavities are ready for the filling material it is found that both are of about the same size. Suppose that there is an equal chance for making a permanent operation in both teeth. Suppose, however, that one of the cavities is filled with gold, and the other has the gingival third of the cavity filled with tin, or gold and tin in combination, as is illustrated in Fig. 2. Suppose that both operations were made by the same man, and an equal amount of skill was used in making both operations. What would be the natural outcome? The operation illustrated in Fig. 2 would later on require attention, for this would be necessary on account of the change of character and form of the tin, or gold and tin in combination, which had been placed in the gingival portion of that cavity. This condition would make it necessary to refill that cavity; not to repair the filling, but to take out the whole filling, remove the decay around the axial wall and gingival seat and refill the cavity with gold. This operation is likely to stand for all eternity. Gold does not undergo a change of character of form. The best results are always obtained where but one metal is used in a given cavity.

CONCLUSIONS.

First, if we believe in the results of the researches of Black and Williams regarding the cause of the decay of the human teeth, then the use of a combination of two metals which in crystallizing contract should under no circumstances

ever receive any consideration from intelligent practitioners. Secondly, the use of any material which causes the dentin to oxidize, thereby destroying the life in the fibrils and the pulp, this in turn leading to the degeneracy of the tooth, cannot be indorsed. The use of such materials is to be absolutely condemned. Thirdly, it is to be deplored that so many men are making the claim that beneficial results can follow the use of combinations of metals of the kind to which attention has been called in this essay. Poorer results than those which have taken place in my own practice no man could possibly have.

I do not believe that the patients for whom I have operated have secretions in their oral cavity which are in any manner different from those of the people who live in other parts of the world. It is also impossible for me to believe that others can obtain results differing from those which I have observed to follow the use of these materials and which have been so fully outlined in this essay. Those who in the past have so strenuously advocated the use of such combinations as I have called attention to are requested to read a short essay in *Current Literature* for August 1903, page 151, the title of which essay is "Are Metals Alive?"

Discussion.

Dr. H. L. Ambler, Cleveland, O. As long as the essayist has seen fit to criticize the use of tin, and tin and gold in combination, as a filling material, it seems to me that it would be fair to consider the properties of tin where it is used entirely for a filling.

Tin foil has been used for about one hundred years in the United States, and one of our distinguished operators said a few years ago, when he was about seventy-two years of age, that if all other filling materials were blotted out of existence and only tin foil was left more teeth would be saved than ever had been in the past.

Where teeth have been filled with tin it has been continually demonstrated that after a time in most cases where the tin was removed the dentin of the tooth had solidified. One of our teachers in a dental college, an expert microscopist, who had observed that fact several times, has termed it "progressive calcification," because, under the filling, especially where it had been placed in a tooth of rather soft structure, the dentin became further calcified and was harder than when the tin filling was placed there. I can show you specimens of teeth filled with tin foil that have been worn in the mouth for years, illustrating this phenomenon. Dr. Chase of St. Louis was one of the prominent men who recommended tin foil for filling sensitive cavities, and with no successful methods of obtunding the sensitive dentin it was too painful for the patient to have them thoroughly excavated; he therefore excavated the cavities as well as he could and filled them with tin. After some months, or perhaps a year or two in some cases, the tin was removed and he was able to cut retaining grooves or pits, or make a dovetail form, whichever he chose, in the cavity without excessive pain. According to his testimony on record, corroborated by the testimony of others, it was found that those cavities had lost most if not all of their sensitiveness, so that they could be prepared for a permanent filling. That is rather different testimony than is given to us in the essay.

I have been using tin foil for filling teeth for over thirty years. At the outset I made no record of my cases, as in those days very few dentists kept any, but in 1883 I commenced keeping a record of cases where the cavities had been filled with tin, and also of those where the gingival third or half of the cavity was filled with tin, and the remainder with cohesive gold. My discussion of this paper is based upon the supposition that the essayist used cohesive gold.

Dr. Wedelstaedt. That is correct.

Dr. Ambler. That is what I thought, and that is the material I myself use. In 1882 I filled on the buccal surface of the lower left second molar a cavity embracing about two-thirds of the surface. Beginning at the gingival portion I cov-

ered the nearly exposed pulp with tin, continuing it for about one-third of the way occlusally, then completed the filling with cohesive gold. Two weeks ago I examined that tooth and there was no sign of decay around the tin or gold.

In 1889 I filled for a patient a disto-occlusal cavity in a bicuspid and a mesio-occlusal cavity in a molar. Ten days ago I examined them and no decay was perceivable around the tin or the gold.

Now, if there is any danger of pulps dying under the tin, why not cover the thin portion of the dentinal wall with some cavity lining? Wherein do we derive protection from the use of gold in preference to tin? Gold is four times as good a conductor of heat, and six times as good a conductor of electricity as tin, so under which metal will the pulp be likely to die the quicker owing to thermal and galvanic action, tin or gold?

I have found since 1882, at the time I commenced using tin for about one-third and sometimes one-half of the gingival portion of the cavity, that one filling in a disto-occlusal cavity in a lower right second molar failed around the gold, the gingival half of the cavity being filled with tin and the rest with gold; the wearing down of the tooth-structure and the gold on the occlusal surface had fractured the enamel so that it broke away, and the filling began to leak around the gold. The patient allowed it to go so long that the gold was forced nearly out of the cavity. I also found that three fillings failed for about one-third the distance across the cervical margin; one filling failed at the cervical margin after it had been in six years, and another after it had been in seven years. That makes seven failures, some total and some partial, of those cases which I have been able to watch.

The essayist tells you that he has used tin in the cervical portion of the cavity for four or five years, but it seems to me that thirty years is a better test than four or five.

Now it may be possible that good tin foil was not used in those cases where the essayist failed. I do not know what kind of tin the essayist used, nor does he describe his method of using it, so I must conclude from what I know about this matter that either the tin foil was poor material or else the method of manipulation was faulty. Now I know that his method of manipulation of gold is complete, and no doubt the same may be said of tin, so the factor of manipulation will have to be eliminated. Then again it might happen that the preparation of the cavity was faulty, yet I think that in the cases he cited that cannot be true, because the essayist is thorough in the preparation of cavities. We are therefore compelled to fall back upon the first premise, that it was poor material. A great deal of the tin foil put on the market for filling purposes is not fit to put in a cavity.

The essayist says that tin destroys the dentin and kills the pulp. The facts, according to my experience, are these: After the tin is placed in the cavity at the cervical margin, filling the remainder of the cavity with cohesive gold, a galvanic action takes place between the tin and gold, the tin being the positive element and the gold the negative; this galvanic action ceases after the tin filling becomes oxidized, and no further galvanic action occurs. In some instances I have found that this oxid does penetrate a slight distance into the dentinal tubuli. I take the ground that if it does so penetrate it helps protect the ends of the tubuli, acting as a barrier to the further progress of decay.

I know that this is true, and if you gentlemen will take the trouble to examine a display which will be found in the educational department in this building you will be convinced by an ocular demonstration of the facts I am stating. You will find in this exhibit a disto-occlusal filling where tin was used at the cervical part of the cavity, the balance being gold, that remained intact in the mouth for twenty-six years, the tooth for some reason or other having been lost. There are teeth in that exhibit, filled by different operators, that have been worn in the mouth all the way from seven to twenty-six years, filled with tin

at the base and the rest of the filling gold, and there is no decay around the tin or the gold.

I can show you in my own mouth an upper lateral that has been filled twice with cohesive gold in the last twenty years by one of the best operators I know, and both of those fillings failed. Ten years ago that tooth was refilled, using tin at the cervical portion and the rest with cohesive gold, and today there is no decay around either the tin or the gold.

I have also a lower left lateral incisor which was filled with cohesive gold and proved a failure. I had it refilled seven years ago at the lingual and also the cervical margin with tin, and there is no decay; the remainder of the filling, being of gold, is also intact.

I have a disto-occlusal cavity in the upper left first molar that was filled with cohesive gold, which was a failure, and six years ago I had it filled with tin foil across the cervical margin, completing the filling with gold, and that is in perfect condition today.

On the right side I have a disto-occlusal cavity in the second bicuspid, a mesio-occlusal cavity in the first molar, filled with gold and tin, the gold being on the occlusal surface; these have been in use three years.

I use tin foil of Nos. 5, 10, or 20—any of those numbers; it does not make so much difference about the gage of the tin. If an operator is accustomed to use thin gold foil he had better have thin tin; if accustomed to the use of heavier gold foil, use heavy tin. Any of those numbers can be manipulated so as to make tight margins. There is another advantage in the use of tin at the cervical margin; it is inserted more quickly and easily than gold, and one cannot fail to cut off the projecting portion, as might happen when using cohesive gold.

I do not say that you cannot make a tight cervical margin with cohesive gold, or with non-cohesive. The question is, does tin make a tight margin? Of course, if there is leakage around a filling the tooth generally begins to decay. But does it not do the same thing around gold and amalgam? Why should tin bear the burden of tooth decay? Do not place the entire blame on the tin alone. Amalgam fillings, cement fillings, and gold fillings all fail at the cervical margins at times.

The essayist says that the tin oxidizes and stannic acid is formed which penetrates the tubuli of the dentin, destroys the dentinal fibrillæ, and kills the pulp. He does not say this occurs every time, and I do not suppose he means to imply that it always occurs. I would be very glad to know how it is done, and how stannic acid is formed from a piece of tin foil upon a solid mass of tin foil well malleted. I want him to explain for my information how it can be that stannic acid is formed from a solid mass of tin in the tooth? I say that as far as my chemistry goes, which is corroborated by two dental chemists, that cannot be possible. Stannic acid is a white substance, and here we have a black substance, the essayist says, penetrating the fibrillæ and killing the pulp.

The essayist also says, whenever a tooth becomes black from the use of tin the dentin becomes soft and you can scoop it out. In those cases where the decay extends along the buccal or lingual wall, the tooth softens. Would it not soften with gold, or anything else? The tin is not to blame.

I think that the drawings the doctor has given us are fair so far as I can judge. About one-third of the cervical portion is shown filled with tin, the rest with gold. Nor do I find any fault with the form of the cavities.

I never have seen a dead pulp under a tin-foil filling. If pulps die under tin, why is this operation advocated by Dr. Herbst of Germany, who says that he amputates the coronal portion of exposed pulps, applies creasote, burnishes a mat of tin foil into the pulp-cavity, and fills the rest with any desirable material.

Now taking up the matter of tin and gold in alternate layers in equal parts. If you use a sheet of No. 4 tin, also use a sheet of No. 4 gold. It can be used in any proportion, but equal portions of tin and gold, in alternate layers, either No. 5 or No. 10, folded as thick as desired and condensed with a mallet, will produce

the best results. I always fold it into a tape, folding the tin and the gold over and over, so as to make No. 20, 30, or 40, and if the materials be used in equal proportions it will stay right where placed. Most of my experience with this method has been in the occlusal surfaces of molars and bicuspids in large cavities, and I have never seen a failure in a filling made with equal parts in alternate layers folded back and forth in the cavity and malleted down with the hand mallet the same as with cohesive gold.

In 1838 Dr. McBride of Pittsburg, Pa., used tin and gold by rolling the tin and gold together, keeping the tin on the inside and the gold on the outside, wedging it in the cavity in the old manner of wedging fillings. If this method had been a failure, would it not have been ascertained long ago? He is the first man that has gone on record as using tin and gold in that way. Dr. John S. Clark of St. Louis, in 1851, was probably the first man to make cylinders of tin and gold in alternate layers.

I can show you specimens where equal parts of tin and gold were used in the cervical third of the cavity, the rest being filled with cohesive gold, and no decay ensued; but my experience in that only extends back for six years, and that is a comparatively short time. I do not use it very often in the above location, because I know that pure tin alone at the cervical margin will answer every purpose.

Just a word about the action that takes place between tin and gold. After electrolysis takes place the joint between the tin and gold cannot be separated with a chisel. The two metals cannot be forced apart exactly at the joint, because electrolysis has caused them to cohere so firmly. When galvanic action takes place in the mouth the tin is discolored and the galvanic action stops. The under surface of the tin filling will generally be black, because there is just enough moisture in the tubuli to oxidize the tin, and this oxidation fills up the ends of the dentinal tubuli and is a bar to the ingress of bacteria, if any happen to be present.

One reason why fillings fail where tin is used at the cervical margin is because the operator did not put in enough tin. If a man thinks he can take one thickness of tin foil No. 10, lay it over the cervical margin in approximal cavities, then go on and complete with cohesive gold and have a tight, lasting filling, he is mistaken. Put in one-third or one-half tin, and very seldom will any of the fillings fail.

The essayist refers to using tin and gold in alternate layers for four or five years. Others have been doing it for forty or fifty years, and have not found out what he has. He refers to an experiment made by Dr. Black, who we know to be a scientific man and nearly always right. In this experiment he says Dr. Black placed an "imperceptible" amount of tin powder upon a sheet of No. 4 gold and laid it away for a time between two leaves of a book, and when he examined it the tin and gold were oxidized and crumbled up fine.

After conferring with Dr. Black I find that the experiment which he made does not bear any resemblance to the one quoted. It was made years ago and probably the essayist had forgotten just what it was.

Since I had the doctor's paper, some four days ago, I have endeavored to procure this "imperceptible" amount of tin. I took a piece of tin and lightly scraped it with a knife blade, removing the very smallest specks that I could and placed those particles upon a piece of No. 4 gold foil, exposed it to the atmosphere in my cabinet, and for the four days that it remained there no change had taken place in the tin or gold. One month has now elapsed and still there is no change.

Five years ago I was informed that if a sheet of gold were placed between two sheets of tin and laid away in a book, in a little while the tin would become oxidized, and that you could blow it away. I tried the experiment, beginning three years ago, but the result referred to did not happen. A few days ago I looked at it, and no more change in that gold can be seen than if it had been placed in contact with the tin yesterday,

and there was no cohesion between the leaves of gold and tin, and no oxidation.

So I claim that all thinking practitioners are justified in using tin at the cervical margin. The essayist says gold will last to all eternity. Gold fillings of 24-karat gold do not last to all eternity in the mouth. If you will look at the Cosmos for March 1904, p. 178, you will see an account by Dr. W. D. Miller of a tooth filled with gold, malleted into the buccal surface of a bicuspid, where grooves had been cut in the gold by erosion; so that gold will not last forever in the mouth. And we have seen a case of a gold crown on an incisor, made of 23-karat gold, where nearly all of the labial surface of the gold had disappeared, leaving an opening in the shape of a letter U; this shows that gold does not last forever in the mouth.

Dr. D. J. McMillen, Kansas City, Mo. I am not an advocate of tin and gold as a filling material. There is no question in my mind that for some purposes a tin filling is one of the best fillings to put in the tooth, although it is not a proper material for every tooth. The fact that one tooth decays under a certain kind of filling is no reason for discontinuing the use of that filling material. If we should discontinue the use of fillings for the reason that teeth decay under them we should have to discontinue the filling of teeth altogether.

There are many things to think of beside the material with which we fill a tooth. The preparation of your cavity has a great deal more to do with the preservation of the tooth than the use of the material, whether tin, or tin and gold, or gold, or amalgam.

If I were allowed to criticize those cavities illustrated by the essayist I should like to do so, although the matter of preparation is not touched upon in the paper. In filling teeth with tin and gold we must not forget two things: (1) That there must not be any square corners; (2) at the point of juncture between the two filling materials, unless extreme care is used a condition will result at that point very apt to lead to decay, as Fig. 5 would demonstrate to my mind in presenting a corner there that is exceedingly difficult to fill.

One reason why I have not advocated the use of tin as a base for filling is that it discolors the cervical wall and makes an unsightly filling. It does not absolutely fill that portion of the tooth if you use tin cylinders; using all gold, and non-cohesive gold, there is no question in my mind but that it adapts itself better to the walls of the tooth than any tin that can be made. I would not be in favor of using thick tin. In adapting a filling of any description, whether it be tin or non-cohesive gold, if I were to undertake to fill the cervical wall with either material, I would not expect to make a tight filling if I used a thick foil. In using this kind of filling it should be a thin sheet of gold or tin. I think tin if properly handled, used either in combination or by itself, has a virtue in saving teeth.

Dr. N. S. Jenkins, Dresden, Germany. Permit me, gentlemen, to say that where perhaps any member here present has seen one filling of tin and gold, I have seen a thousand. Tin and gold had its origin in Europe for practical uses. It was before the age of the rubber dam; it was an expedient designed to overcome the great difficulties of preserving teeth, before the rubber dam or cohesive gold had been dreamed of. It serves two purposes: It immediately stops decay and it continues to improve in its beneficent action. I have seen innumerable teeth which have been in their partially erupted condition exposed to the ravages of decay and which have been filled under water with tin and gold to the preservation of those teeth for thirty years without recurrence of decay.

Now you will naturally inquire, How did that happen? Gentlemen, it is my belief that it occurred only through perfect mechanical adaptation and not through any chemical action, or at least the chemical action being only subsidiary. When tin and gold united in proper proportion is packed into a cavity by lateral pressure, the only way in which it can be judiciously applied, it is almost immediately subjected to electrical influ-

ence, and as Dr. Miller has so exactly explained to us, an oxid of tin is formed, the filling becomes distinctly greater in bulk and possessed of a crystallization which makes it resistant to the force of mastication. That is the reason that teeth are preserved by tin and gold, because the filling by expansion improves after it is made, and tin and gold, so far as I know, is the only material with the exception of porcelain which exercises a continual progressive protective power against the ravages of decay.

Dr. W. R. Clack, Clear Lake, Iowa. I was taught to use tin foil and a combination of tin foil and gold between 1876 and 1878. Undoubtedly, owing to the imperfect manner in which I had used it, I am obliged to stand here and tell you gentlemen that every filling that I have had the opportunity of watching and observing has failed. Be it understood I was a young practitioner, and also be it understood that a great many of the fillings that I made with cohesive gold and with amalgam also, at that time, have since failed. So that that is not conclusive proof that it was all on account of tin.

The idea of the oxidization of tin or any metal preserving the tooth-structure, has always been to me a queer proposition. It seems to me as if it were an argument that it was necessary to partially destroy the substance in order to bring out its best qualities. I know that it has been a custom to use silver nitrate for the prevention of decay. If you could have been in Dr. Wedelstaedt's office last winter and seen a set of teeth that had been treated by an advocate of silver nitrate for the prevention of caries in the human teeth, I do not believe you would have been guilty of again using it. It did undoubtedly prevent decay for the time being; but the after effects of that application were a great deal worse than the first condition. I am not able to give you just the chemical reasons why this result occurred.

That those fillings have failed where cohesive gold has been used in the gingival third of cavities in approximal surfaces of bicuspids and molars is nothing to be wondered at. Gentlemen, a man is an expert who can make a perfectly absolute adaptation of annealed gold at the gingival margin of those cavities every time; there are very few such men alive today. In place of cohesive gold I use unannealed gold, because I believe it is as easy of adaptation as tin foil and I believe that it is as lasting and can be just as evenly placed.

Right here let me say that the criticism of those fillings as failing because of the overhang at the gingival margin is not a criticism necessarily against gold any more than any other material. Any man who leaves an overhanging margin invites the recurrence of decay.

I have not been in practice quite as long as Dr. Ambler, and I have not been as close an observer for as many years as he has, but I can show you a patient in the city now who has nearly every approximal surface of the bicuspids and molars filled with unannealed gold for the gingival third; and there is no recurrence of decay.

The last speaker told us of fillings made for him with gold that have failed. Granted. He tells us on the other hand of fillings that have been made with a combination of gold and tin that are in perfect condition today. We believe there is such a thing as immunity. I have cavities that decayed in my central incisors twenty-seven years ago, and I cannot see by the closest examination that they have progressed a particle in all that time.

Dr. Ambler. Have they been filled?

Dr. Clack. No, sir; they are open cavities. I have seen in Dr. Wedelstaedt's office a patient who has also upper central incisors slightly decayed, where there has been a total cessation of that decay and the patient is absolutely immune to the ravages of decay, those cavities still being unfilled.

Unless those cavities mentioned by the last speaker had been filled by the most expert operators, a recurrence of decay would likely have ensued; but in certain other cavities a man can make a filling with almost any material and there will be no recurrence of decay.

These cavities were filled for Dr. Ambler when he was young; he has been confined to an indoor life, and I would judge his teeth are subject to decay from the number of cavities he has spoken of, and no doubt a great many of those fillings had that overhang.

As for the preservation of any particular tooth for any length of time by the use of any one material, it does not prove anything. Several years ago I was out hunting near Clear Lake, Iowa, with an old soldier who had a great habit of chewing bird-shot. He had a cavity, decayed, in the buccal surface of the lower right first molar which he had often intended to have filled but had never done so. One day he came up into my office and said, "I was going to have a filling put in that tooth, but I have one there already." On examining it I found the cavity to be closed with one of those bird-shot. This spring he came in again, and I extracted that molar with that bird-shot in the cavity, seemingly just as absolutely perfect a filling as any that could have been made for him of other material. So that it does not do to tie up to any one thing in the way of filling material; and I believe that these cavities in Dr. Ambler's teeth, which he refers to as having been in for only the last three years, were inserted at a period of immunity to caries; and I believe that a gold filling, properly placed there, would undoubtedly have been there today.

Dr. WEDELSTAEDT (closing the discussion). I have called your attention to such conditions as I have found to exist where tin, and a combination of gold and tin, have been used in the gingival third of cavities in the approximal surfaces and gold has been used to complete the operation. I have called your attention to the exact conditions as I have found them to exist.

One speaker stated that gold and tin in combination is the best material to use for filling cavities in the human teeth. He alleges that there is no material any better except the porcelain inlay. And yet experimental research proves beyond a doubt that it requires more pounds pressure to crush cement than it does to crush similarly sized pieces of some porcelain inlay material which is at present being made considerable use of. Porcelain inlays have but a limited use and are temporary fillings, which sooner or later must be replaced with something more permanent. As Dr. Southwell so truly says, "Porcelain inlays are but plastic operations."

Another speaker said that he made nine combination fillings in cavities in approximal surfaces. The gingival third of these cavities he filled with gold and tin in combination, and then completed the operation with gold. He alleges that seven of these nine operations failed. His statement merely proves the contention which I made. The same speaker said that for years it has been the habit of many practitioners, when dealing with unusually sensitive dentin, to fill the cavities with tin. The tin is then allowed to remain in the cavities for six or eight months. At the end of this time, when the tin is removed, it will be found that sensitivity has entirely disappeared and the cavity can be prepared without the patient suffering any pain. His statement also proves my contention as to the ability of the tin to destroy the life in the fibrillæ. And yet, again, he asserts that he has in his exhibit many extracted filled teeth which have been filled according to the method which I condemn, and that not one of the operations shows any sign of failure. I have been requested to ask where these teeth were obtained and why they were extracted. If they were extracted from the mouths of people who are dead, his evidence is of little value. If they were extracted from the mouths of those suffering from pyorrhea alveolaris, why then I can say that where this condition exists decay does not readily take place.

The present condition of affairs as it relates to our profession is very singular. I read an essay for your consideration, embodying therein my ideas of certain conditions as I have found them to exist after making combination fillings in the cavities. You are told that such conditions cannot possibly exist. Yet for the past eight or ten years I have been,

and am still, meeting with just such conditions as described in my essay. If others have not sufficient ability to recognize the existence of these conditions, it surely is no fault of mine. The conditions spoken of are there and they can readily be found. I have come to you calling attention to these conditions, not for my own glory but for the good of those whom we serve. This is not only for our own advancement at the present time, but that those who may come after us and who will make the experiments—thus proving the truth of my ideas—may say that all were not so ignorant at that time and age.

I believe in a man standing by his convictions, provided that they are based on experience which he has gained either at the chair or in proving experimental research. Where a man has such evidence he has a just cause and a good fighting foundation. Where, however, a man has convictions which are based upon "say so," and makes contentions for the wrong, that man has no right to be a dentist, and further he has no place in our profession. By continually dwelling upon the importance of following something the truth of which he cannot prove he becomes an enemy of mankind. This continual clash of ideas between those who know and know why they know, and those who think that they know and know not, should long since have come to an end.

Let us try to do good and be kind, in preference to doing some things about which the less said the better. Let us discuss these matters from a foundation which rests upon knowledge and experimental research, which will prove the truth of our results. Nothing is ever gained by making contentions where there is not a vestige of truth to prove the contention. Let us rather work for the future of our profession, its advancement and progress, than to be forever dwelling upon its past history.

It is a self-evident fact that this is about the time and place to use a saying of the brainy Prof. Lewis. In a discussion very similar to the one which has taken place here today he was called upon to close the discussion. He arose and said, "Vell, all I have to say is this, Some mens have nothing to learn and nothing to forget." I am very thankful to say that I still have very much to learn and consequently will have something to forget.

Adjourned until Tuesday, August 30th, at 2.30 P.M.

SECOND DAY—TUESDAY, AUGUST 30.

The section was called to order promptly at 2.30 P.M. by the chairman, Dr. C. N. Johnson.

The CHAIRMAN. The first paper on the program is by Dr. JAMES M. MAGEE of St. John, N. B., and is entitled "The Instrumentation and Filling of Crooked Root-Canals." [This paper and discussion will be published in the Transactions of the Congress.]

The CHAIRMAN. We were to have a paper on the subject of "Pressure Anesthesia," but in the absence of the paper, and as Dr. R. B. TULLER, Chicago, Ill., has prepared a discussion on that subject, I will call on him to speak upon it.

A TALK ON "PRESSURE CATAPHORESIS."

Dr. R. B. TULLER, Chicago, Ill. The subject I was asked to discuss today is "perdentinal anesthesia"; but as the paper bearing that title is not to be presented, I have been asked by Dr. Johnson to deal with the subject notwithstanding. As I interpret it, it is what has been called "pressure anesthesia," but it seems to me it would be more correctly termed "pressure cataphoresis." So far as concerns this discussion, at least, I will consider the three terms equivalent.

I presume there are few here who do not know that the terms refer to a mechanically induced penetration of a liquid anesthetic agent into the dentin and into the dentinal pulp. Its application has been directed more to exposed pulps, to enable their painless extirpation, than to dentin to obtund sensitivity.

The question of how it was discovered and came into use is somewhat obscure.

Until recently my understanding was that it was first introduced some ten or twelve years ago by a Dr. Funk of Chicago, who went about selling the secret and privilege to use it. It could not long be a secret under such circumstances.

It came to my notice just about the time of the flood-tide of electric cataphoresis, or a little after. But not long ago I received a letter from Dr. Henry W. Gillett of New York, in which he says "The introduction of pressure anesthesia was much earlier than you place it. I used it in the late eighties, with syringe points exactly as shown by Dr. J. A. Johnson in the March *Items of Interest*. My use of it was due to a paper read before the Harvard Odontological Society by Dr. E. C. Briggs, and published in a now defunct journal that I do not remember the name of."

Now, however or whenever this pressure process was introduced, I want to emphatically indorse its virtues as nothing less than a blessing to humanity—including the dentist, who needs some consideration in the trials that afflict his patients. The full extent of its value seems not to have been known until more recently. I do not know that anyone has exploited it more than myself, though there may have been many; but what I have succeeded in doing I have published. I am quite free to admit, however, that I have not arrived at that stage where I can be positive and sure of producing perfect anesthesia in every case—on the other hand, I have encountered a number of cases so obstinate, or in which my manipulation or method of application was so faulty, that I had to give up. But I want to say this, that if one can succeed once in five times that one time will win him over as an advocate and induce an affirmation of what I say as to its being a blessing to humanity—a veritable godsend in many cases. And I believe we may yet understand it and have the application so under control that we can operate with positiveness and certainty in a large majority of cases, if not all.

I do not attempt pressure cataphoresis in every case, because it takes a little time and is of such a nature that I feel that I ought to be fairly compensated for such truly skilful service—when successful, at least; so I do not suggest it on all occasions. Often, however, it is to our own interest to employ it as far as time and facility of operating is considered and the strain on our own nerves is concerned. We all know that in a large part of our work we need nothing but to operate deftly with sharp burs and instruments, and I do not imagine you would apply pressure cataphoresis except in such cases as are excessively sensitive, or to extirpate pulps, though possibly in time, if we can be more certain of success, it may be demanded of us in a general way.

My early experience with pressure cataphoresis was in its application to exposed pulps, and my efforts were too frequently failures. But now and then one would succumb to the application so quickly and completely that I could not help feeling elated with the scheme. I determined to find out the reason for failures, if I could. I felt sure that in some instances it was due to not being able to confine the solution under pressure as it should be to be forced into the pulp.

I found really few cavities that had complete surrounding walls and were otherwise favorably shaped to confine a liquid under pressure. I sought out a means to confine my medicament to the exact exposure without regard to cavity shape other than being open and available to the method. I succeeded in this and found I could be positive and sure in a very much greater number of cases; so many, in fact, that I began to feel that I had a sure and certain way for every case. I have since found, however, some cases that do not respond readily and some not at all.

Now, from time to time I found instances where a considerable thickness of dentin still covered the pulp, and I applied my method, confining the solution positively in one spot directly over the pulp, and got as good results almost as quickly as when the exposure was complete. Of course, all understand that in cases of exposure or nearly so we begin

pressure at *nil* and gradually increase it until we have used a considerable force. In my method this pressure is equal to several hundred pounds to the square inch.

My success in forcing the solution through a thin layer of dentin in the bottom of a cavity led me to the thought that the entire thickness of dentin from enamel to pulp might be penetrated by medicaments, and I began immediately to exploit that idea by making a special opening for my application of the pressure method and ignoring for the time the cavity of decay. I succeeded beyond all expectation. In a minute or two I found in most instances the entire crown of the tooth was so anesthetized that I could cut, bur, and grind at will without any pain. In cases where I wanted to extirpate the pulp I found I could do it directly from this special opening through the enamel, or utilize the cavity —and without pain in either case.

If, after getting into the pulp-chamber, sensitivity was found rootwise, it was only necessary to re-apply the cocain and pressure in the pulp-chamber. In some instances I have found canals so obstructed or tortuous that I was slow in getting the pulp out, and sensitivity would return to some extent in other roots. In such cases it was only necessary to close the root I had cleared, charge the chamber with the solution and repeat the pressure for a few moments. I have in some cases left one root until another sitting and then cocainized it again by pressure. When we once reach the chamber we then have no trouble about confining the liquid by means of a piece of vulcanite rubber. I obtain the required degree of pressure and confine the solution in any way that seems best in each case, but one would find it a difficult thing to confine a liquid on a flat surface with a piece of vulcanite rubber. I can, however, do that with the means at my command and can anesthetize a tooth by grinding off a cusp until dentin is exposed and then proceed with my pressure cataphoric method.

When I desire to extirpate a pulp without bothersome post-operative hemorrhage, I use adrenalin. This, you know, is a preparation that injected with cocain into the soft tissues permits of what is termed a bloodless surgical operation. As adrenalin is a sterile solution I use it generally to dissolve the cocain whether the application is for sensitive dentin or pulp-extirpation. For the latter it is proper to apply the solution directly to the exposed pulp, or force in the adrenalin alone, since enough of it may not pass through the dentin to exercise its contractile effect upon the pulp, though the anesthesia may be complete.

The special opening or aperture is made usually near the cavity of decay in healthy tooth-substance, though I sometimes select a small defective spot that sooner or later must be filled any way. When the opening is made in healthy tissue there is no danger of forcing septic matter into the pulp, as might possibly be the case in utilizing a cavity of decay. However, so far as my experience goes, I have had no serious trouble in utilizing the cavity of decay when that is convenient, first removing débris and soft decay and treating it antiseptically. There have, however, been some reports of tenderness or other evidence of disturbance for the first day or two after a tooth has been cocainized through the cavity of decay, and it has been attributed to the cocain. I am inclined to think it due to septic infection carried in with the cocain, and the special opening might obviate this; besides, I think healthy tubuli will conduct the anesthetic agent better than those clogged possibly with disintegrated dentin.

Producing, as I have done many times, both slight and profound anesthesia in the entire coronal part of a tooth through these special apertures, I have no hesitation in saying that it can be done in many cases; and to illustrate how these openings may be made where they will do the least damage if any at all, I published in the *American Dental Journal* last March an article with illustrations of all the teeth on one side of the maxilla, designating the places. In molars and bicuspids I would make the opening,

when possible, where in extending the cavity it would be taken in, requiring no extra filling to repair it. If this is not practicable in a particular case, I endeavor to find in the occlusal surface some weak spot that might require filling at some future time if not then; this, of course, would have to be specially filled aside from the larger cavity.

In the six anterior teeth, which would rarely be available through approximal cavities, I operate through the lingual fossa, the special aperture requiring a separate filling. To force the cocain into any of these openings I sometimes use the old way of placing a pledget of cotton saturated with the solution in the opening and cover it up with soft rubber or gutta-percha to prevent regurgitation under pressure. I sometimes confine the solution *over* the opening so perfectly as to force it in under pressure. When using the soft rubber over the cotton I often use the automatic mallet instead of steady pressure.

The cases that will not respond to this pressure method I have pretty well determined are cases where secondary dentin has been deposited. There may be other abnormal conditions obstructing the canals, but I have found in a number that were of slow responsiveness that the pulp-chamber bore evidences of secondary deposit. Of course, there are many cases where it is not desirable to expose the pulp-chamber and we can only surmise the cause of failure to anesthetize the pulp.

Now, when I say "without pain," I mean without pain in most cases. The stubborn ones may yield after a time or may not yield at all, and of course, when not obtunded, or only partially so, may give rise to some pain and may require a second application. But when the anesthesia is complete there is absolutely no pain.

To cite a few instances, I have cut off a number of sound teeth one after the other, as high as eight in one mouth, that were to be utilized for bridge supports, and from the start to the finish have caused no pain beyond a mere suggestion of it as my bur passed through the enamel and entered into the dentin. I have removed a little enamel with a cutting wheel, exposing a little dentin, and confining my solution to that spot have produced anesthesia by pressure that permitted cutting and grinding of the tissues without pain.

In regard to the question of obtunding dentin, I labored for some time under the impression that the remedy must be applied directly to the cavity we desire to operate on, and that our medicament must saturate all the walls. In using my method comparatively few of the tubules are covered; but through these the cocain is carried to the pulp, and when a zone of that organ has become anesthetized all the fibrils or prolongations of the odontoblasts that penetrate the dentin from that zone are anesthetized. I have no faith in obtunding done in any other way than by making the agent act upon the pulp.

I believe this is to be one of the live and most interesting topics before the profession today, and worthy of our serious attention and investigation if we are to relieve the suffering of our patients in many, many instances. It is worthy, even though we fail four times and succeed once; one happy success will repay all our efforts and set us to thinking why we failed, and where many are searching for it someone may better find than I have the cause of such failures. I am looking for the dawning of an era of really painless dentistry, performed rationally and safely and without discouraging and unhappy sequences.

Discussion.

Dr. F. L. Fossume, New York, N. Y. I would like to have the essayist tell us in closing whether there is any pain under the tremendous pressure in injecting a solution of cocain after the small cavity is drilled in the central incisor?

Dr. Tuller. None in the least.

Dr. Fossume. Have there been any bad after-effects?

Dr. Tuller. Not to my knowledge. Pressure anesthesia, so called, has been used very extensively for more than ten years by way of the cavity of decay, but

I have never heard of any unfortunate sequences.

Dr. Fossume. Are there any special instruments used?

Dr. Tuller. There are several on the market, I believe. The main point is the proper confinement of the liquid, used so that it cannot escape but can be absolutely forced into the tubules of the dentin, or into the exposed pulp. It has been thoroughly demonstrated that a liquid agent may pass under pressure through the entire thickness of the dentin and thoroughly anesthetize the pulp, but it should be borne in mind that the quantity is but the small fraction of a small drop—not a flooding of the pulp-chamber.

Dr. J. I. Hart, New York, N. Y. It is the proper confinement of the fluid in the cavity that makes the operation possible, and unless it is confined in the cavity the operation is *nil*. The essayist has informed us how it is done, but it is done by the use of the instrument he has devised. There is another instrument in use, one devised by Dr. Meyer, and that instrument will also permit us to confine the medicament in the cavity, and it is only when that medicament is confined that we meet with any success. When cocain or adrenalin is pressed in with cotton and surrounded with soft rubber the liquid is almost bound to get out, but with the instrument it is forced into the tubules, and I can positively say that the result is admirable.

Dr. L. N. Rudy, Tooele, Utah. Instead of using a liquid solution of cocain I make a paste of cocain and glycerin, and place it in the cavity, after getting as nearly an exposure as possible. I use a piece of unvulcanized rubber that will more than fill the cavity, and finger pressure gently at first and increased pressure as pain decreases.

The way to avoid failures is to make a very careful diagnosis of the conditions existing in the pulp when the case comes to you. I found in cases that came to me that the application of this agent was of no more avail than if I had used water, and in other cases in two or three minutes I could open the pulp cavity with a bur, run a broach to the end of the root and take the pulp out immediately.

Two months ago a young man came to my office with the pulp of a lower left first molar completely exposed. I applied this same treatment I have spoken of, and timing myself carefully, I found I had taken out the entire pulp in just four minutes from the time I made the application.

I find one source of failure is due to an inflammatory condition of the pulp. When the cocain is not readily absorbed, if you will investigate a little farther you will find a little pus pocket upon the surface of the pulp. When the pulp is in this condition the cocain will not be taken up because the circulation of the pulp is destroyed. In a condition of this kind the application may be left *in situ* for ten or fifteen minutes without getting any results; but in cases where the pulp has not been the seat of such disturbing phenomena, and its removal is necessary, it seldom takes more than three minutes for the cocain to act.

I have been more than pleased with pressure anesthesia for the extirpation of pulps, but it is likewise gratifying to have a method of painlessly preparing sensitive cavities.

Dr. H. G. Atwater, Los Angeles, Cal. I desire information on one point made by Dr. Tuller which I did not understand; that is, why one point in dentin is sensitive and another is not.

Dr. A. M. Lewis, Austin, Minn. A great many operators labor under the idea that a large opening will give better results, but I find the smaller opening gives the best success.

Dr. C. F. Shoop, Central City, Colo. I would like to ask the doctor about his experience with carbolic acid in pressure anesthesia. I would like to know whether he would use it in sensitive dentin or to remove the pulp, and whether pericementitis follows such a procedure.

Dr. C. L. White, Oklahoma City, Okla. I have never attained much success with pressure anesthesia in obtunding dentin for excavating where any considerable amount of tissue had to be

penetrated to reach the pulp, but there is conclusive evidence that it is being accomplished in a most satisfactory way in skilful and patient hands.

I think the development of pressure anesthesia in the surgical removal of pulp is one of the greatest forward steps that has been made in operative dentistry in many years. It is my practice to follow the removal of pulp by filling the canals at the same sitting unless it is contra-indicated in the case at hand. There are many reason urged against immediate canal-filling, but I consider it one of the chief advantages gained by pressure anesthesia. At first I used carbolic acid as an agent for producing anesthesia of the dentin and of the pulp, but about four years ago I commenced using a solution of cocain, and my success has been phenomenal. It seems that a very small percentage of dentists are using pressure anesthesia, but if given a thorough trial I think none would again be without it. In a great majority of cases where pulp is exposed, or nearly so, absolute anesthesia may be obtained even by crude methods, and when used carefully and skilfully as Dr. Tuller describes, its field of usefulness is very broad.

In a certain class of cases my success has been only partial, but even in those cases where anesthesia is only partial or where it has apparently failed completely, I believe the pulp may be removed with as little pain as would follow the use of any other method and certainly with less danger of permanent injury to tooth and pericementum.

Dr. A. Owen, Cisco, Tex. I would like to ask Dr. Tuller the percentage of cocain he uses and what is his favorite vehicle for carrying the cocain.

Dr. W. I. Brigham, South Framingham, Mass. If we had always known of pressure anesthesia in removing the pulp and someone had discovered that arsenic properly applied would destroy the pulp without pain, I think we should hail it as a great discovery in dentistry. There are times when pressure anesthesia is valuable, but there are other times when something else is more valuable. There are times when pressure anesthesia can be applied for four or five minutes, but arsenic can also be applied to a sensitive or aching pulp immediately, the patient can be dismissed in two minutes, and in a week's time the pulp can be removed absolutely without pain. Each has its place. I would no more think of giving up arsenic for pressure anesthesia than I would think of giving up anything in the practice of dentistry.

Dr. W. Kassab, Chester, Pa. I am glad someone broke the ground and spoke about arsenic. I do not have any trouble from the use of cocain in pressure anesthesia, but I only use it when I think I have time to complete the operation. I would like to ask the essayist whether he has any trouble with bleeding, and what his method is of stopping it.

Dr. J. A. Todd, St. Louis, Mo. I think it has been stated that in some cases troubles of infectious nature follow the use of cocain by the pressure method, and I would like to ask Dr. Tuller what his experience has been in that direction.

Dr. Otto Hollinger, Chicago, Ill. I think we all know that the pulp is a part of the body the same as any other tissue, consisting of nerves, bloodvessels, and connective tissue, and therefore is subject to the same influences that other tissues are. A new element has been added to cocain, which is adrenalin. Adrenalin is a vaso-constrictor and is also slightly antiseptic and anesthetic, and therefore it has been adopted for use in combination with cocain. In inflammation of the pulp the bloodvessels are very much engorged, and adrenalin will produce anemia. Cocain will accomplish that as a rule, but not to the same extent as adrenalin, but where the pulp has been inflamed for any length of time and granulation or partial calcification or any other pathological process has taken place in it, the degree of degeneration which has taken place will of course determine the partial or entire failure of cocain. For instance, if the pulp is partly degenerated it will still be acted upon, but not so quickly or thoroughly. If totally degenerated, of course, it will not be affected

by cocain at all. Surgeons in injecting cocain in secondary operations, as they frequently do when the patient is very much depressed, find cocain will not act because of the poor vascularity of scar tissue. In pulp nodules, or where the pulp has died completely and there is necrotic tissue present, cocain will not work, or if it does it will do so very poorly, but the addition of adrenalin will hasten the penetrating power of the cocain and the degenerated fibers will be affected more readily.

Dr. H. E. Friesell, Pittsburg, Pa. For about seven years I have been making use of cocain in pressure anesthesia, and have not found it necessary to have a special instrument, or to confine the liquid to the cavity absolutely. Old vulcanizable rubber, the largest instrument that can be inserted into the cavity, and a gradually increased pressure will give gratifying success in probably ninety-eight per cent. of the cases.

I have had cases of local sepsis in the pulp, but have never had a failure that could be attributed to such condition.

The greatest difficulty will be found with pulp-stones. Where a case does not respond quickly to pressure treatment, I now suspect pulp-stones and usually find them. Even in these cases considerable anesthesia will be produced, and one can drill as far as tolerated, make repeated applications of the cocain, and success will be attained.

Acute inflammation of the pulp has been given as a frequent cause of failure in this method; yet this is precisely the condition in which pressure anesthesia has been of the most benefit to me. Where the pulp is so highly inflamed that the application of arsenic is out of the question, the pressure method works like a charm is *supposed* to work.

Most of my failures I attribute to an adulterated or deteriorated specimen of cocain.

I would like to have Dr. Tuller state whether he has ever observed any toxic effects from the use of cocain or formalin by this method.

Dr. L. D. Mitchell, Arkansas City, Kans. I have used it for about four years, and the greater part of that time with perfect results. I do not mean by this that every case coming into my office is relieved in from three to five minutes and sent out smiling, but I do know that I can handle a case better with pressure anesthesia than with arsenic. If a tooth is aching and the pulp inflamed the application of arsenic will cause it to ache worse, with perhaps no results. In such cases it is better to apply a little oil of cloves to relieve the inflammation before attempting to anesthetize the pulp.

Dr. W. J. Taylor, Sacramento, Cal. We all know that as a general rule arsenic is contra-indicated for general use in the deciduous teeth. But cocain pressure anesthesia can be used there to splendid advantage, and carrying out the suggestion of Dr. Ottolengui, presented some time ago in the *Items of Interest,* I have used it in a number of cases to devitalize the pulp of deciduous teeth, and I must say, with the most satisfactory results. I think it is a splendid agent when it becomes necessary to extirpate the pulp at one sitting.

Dr. F. M. Cockrell, Leavenworth, Kans. Pressure anesthesia, like all good things, is often overdone. I seldom use it to obtund sensitive dentin, but do use a perfectly sharp bur, touching the cavity lightly, so as to shave the tooth-structure. It seems no one here has had trouble with pressure anesthesia—only perfect success; but here is what I did once with pressure anesthesia: I removed the nerve in an incisor and at once filled the canal. Later I found I had passed the point through the apical foramen for quite a distance. I had anesthetized the tissues beyond the foramen and obtained no response from the patient when the point passed through the opening. Lately I have used formaldehyd and adrenalin, and once or twice the patient has had a very sore tooth, but I believe it was not permanent, and I would like to know if anyone else has had trouble of that kind.

Dr. N. A. Neeley, Christchurch, New Zealand. Success with pressure anesthesia is due to pressure, as I understand it,

and success usually follows in proportion to the amount of pressure used. I have been using pressure anesthesia for some seven or eight years and within the last few months I had made a hypodermic syringe and a pair of forceps, the forceps to be used in connection with the syringe to obtain the greatest pressure. A special point was made for the syringe, on which was a little shoulder about 1/32 of an inch from the handle. On this was placed a little disk about ¼ of an inch, perhaps smaller, and on the disk a little rubber disk, which is made so it can be fitted over the cavity. I am speaking of approximal cavities in the front teeth. In this way the fluid can be confined to the cavity and the forceps used to put on extreme pressure by holding the disk with the left finger and using the pressure with the right. I have been very successful in producing practically painless operations on the front teeth.

Dr. TULLER (closing the discussion). I think Dr. Rudy is the first I have occasion to answer. In regard to the putrescent condition of the coronal portion of the pulp, it may be unwise to undertake pressure anesthesia (cataphoresis) in such a cavity knowingly. There would be every chance of forcing septic matter into the pulp; but since we remove the pulp at once, I hardly think any damage can be done. In cases of that kind I think I would select preferably another point for application, say at the neck of the tooth with the probability of reaching a point where the pulp was vital. I have done that very successfully. I have perfectly anesthetized a pulp in an upper molar by application through a cavity well up on a denuded palatal root.

Dr. Shoop asked about the use of carbolic acid in pressure anesthesia. It may be a good agent; I do not know. All my applications have been in the line of cocain. I take a few drops of adrenalin on a slab and put in a few crystals of cocain and go to work. I do not aim to get any certain percentage.

Dr. Bowen spoke about stopping bleeding. That is done by the use of adrenalin. If not enough has been incorporated in the mixture it is easy to inject more into the pulp to be safe on that point, after it is anesthetized; or it may be pressed in with a rubber plug after the removal of the pulp.

In regard to the use of arsenic spoken of by Dr. Brigham. Arsenic certainly did its part well for many years because we had nothing better. I have not used arsenic for four or five years, except where the canals were obstructed, and in every one of these cases I failed, more or less, with arsenic, to the best of my recollection. When, after a good deal of effort, I was enabled to gain an entrance into the pulp, I almost invariably found a condition of secondary deposit or pulp-stones; so I felt that certain conditions of secondary deposit have an effect in rendering the action of arsenic to some extent valueless, the same as it seems to obstruct the action of cocain. The great point in favor of pressure anesthesia as against arsenic is the saving of time, as well as being painless. Frequently a pulp can be extirpated in three minutes; while with arsenic it will take from several days to two weeks before it can be removed painlessly. With the pressure method I have taken out a live pulp without the patient being aware of the fact until it was shown to him on the broach.

I think what I have said in reply to Dr. Bowen will answer Dr. Kassab's question about bleeding.

Answering Dr. Todd, who spoke about infection, I will say that I operated in cavities of all varieties before I discovered that the solution would go through the entire thickness of dentin. I thought I had to expose the pulp, and while I have done so again and again I have never had any serious infection in any cases. I have had a few cases where complaint was made by the patient of a little sensitiveness in the tooth, but a little later it all disappeared. I think that tenderness might follow the taking out a live pulp in almost any manner, or in forcing in an agent to simply obtund, but no serious sequences have been reported to my knowledge.

Speaking about toxic effect, I have

never had any indication of it, nor have I heard anything that was in any way authentic. I presume in cases with a large apical foramen the cocain might be forced through in such a way as to get a toxic effect; but ordinarily I do not think we would experience any effect if we use any sort of discretion. Only a very minute quantity can be injected through the dentin at best, and only a minute quantity is used by any method I employ.

I have not said anything about immediate root-filling; I leave that to every operator's own judgment. I sometimes fill immediately and sometimes leave it until a day or two afterward, keeping the canal sealed with an aseptic dressing.

The subject was passed and the section adjourned until Wednesday, August 31st.

THIRD DAY—WEDNESDAY, AUGUST 31.

The section was called to order at 4 o'clock P.M., by the chairman, Dr. C. N. Johnson.

The first order of business was the reading of a paper entitled "The Cement Problem in Inlay Work," by Dr. GEO. C. POUNDSTONE of Chicago, Ill. [This paper is printed in full at page 756 of the present issue of the COSMOS.]

The hour being late, the chairman announced that the discussion of Dr. Poundstone's paper would be postponed until the Thursday session.

Meeting adjourned.

FOURTH DAY—THURSDAY, SEPT. 1.

The section was called to order at 2 o'clock P.M. by the chairman, Dr. C. N. Johnson.

The first order of business was the discussion of Dr. G. C. Poundstone's paper.

Discussion.

Dr. G. V. BLACK, Chicago, Ill. All I wish to say is simply to call your attention to the fact that this is another and a new method of studying cements; it is one that we have not had before us previously, and one that promises to give us very great and important information upon the subject. I have been over a number of these slides myself with the microscope and know there is more yet that can be said about these individual slides, as illustrating the character—the failures as well as the successful points—of these cements. The very important relation of cement to inlay work makes it one of the vital questions, and I am sure the manufacturers of cements will take up this plan and study and correct some of the elements of weakness of the cements as now presented.

Dr. J. N. CROUSE, Chicago, Ill. That cements are defective, that the weak point in inlay work is the cement, will not be denied by the most enthusiastic porcelain workers. It is the weak point of bridge work, it is the weak point in all lines where we have to use cement as a retaining material for fillings or crowns. Thus far nothing has been found that will take the place of phosphoric acid and zinc—a combination of them—to make cement. My belief has been, and I still have the faith, that the coming material will be a plastic material to correct the improper color, or to correspond with the color of the teeth.

The point I want to raise is, first, on the question of accuracy, by the use of twenty-five pounds pressure in cementing two slabs together with a view of ascertaining first the expansion or contraction, and second the solubility or penetration of the coloration around them. I can take the same cement, the same proportions, and mix them, and have an expansion in my test tube of from 2 to 10/1000 of an inch. I take the same proportions and pack in another way and have a shrinkage of 2/1000 of an inch. If I am accurate and have it stand pat, neither shrink or expand, by pressure put on the packing of a tube or by pressure put on the inlay in cementing it in, the expansion will be in proportion to the amount of pressure to a greater or less degree, the expansion

being a great deal more with heavy pressure than where it is less. I have not set inlays enough to pronounce upon that, but I believe it is a mistake to put much pressure on an inlay when cementing it.

There is another question coming up, and I predict right here that the present method of making inlays will be absolutely revolutionized within a not very distant time. The change is going to be brought about by fusible cement. An exhibition was given in a clinic here this morning where the material was mixed into the form of a paste or cement, placed in the cavity, allowed to set and was baked without a matrix. In this material there is forty per cent. less shrinkage in the first bake than there is in porcelain. The cement will be absolutely fine, too, and the cement powder absolutely without crystal. In the illustration it was shown that those granules were so large as to make it impossible to fit an inlay perfectly and allow for the removal of the platinum and matrix. When I make this bold assertion that it is going to revolutionize the method of inlay and porcelain work I do so with the boldness that comes by experience. I have given it a great deal of thought and observation, I know what I am talking about, and when I say it will be one-third stronger than porcelain inlay I assert that with absolute assurance of being able to produce proof. I have watched a good many settings of other men's cements. I have seldom seen a dentist mix his cement right. I have been mixing barrels of it the last ten years and I know how it ought to be mixed. The spatulas are too small. I want a broad spatula, so that it will take up the whole mass, which should be thoroughly mixed. The question of adhesion of cement I consider one that is easily remedied. I have been using a good cement and it is sticky, it is so sticky that my girl said she could not mix it. There has been a great deal of complaint because it takes more elbow grease to mix it.

Dr. A. E. Webster, Toronto, Canada. There is only one phase of this subject I desire to say anything about, and that is with reference to the permeability of cement by bacteria. I have done some work in connection with the subject, having found results corroborating what the essayist ascertained. I found that in nearly all cases cements are permeated by bacteria in from six hours to sixteen or twenty days, the extreme being about twenty days. The question that has always been asked me was, "Do the bacteria pass through the substance of the cement or around it?" I was not able to answer that question, but I think the essayist answered it thoroughly well yesterday. Where they contract at all the bacteria will pass around them, as was shown in the illustrations. Then there are other cements in which the bacteria will pass right through the substance of the cement. It seems to me very difficult to strike a medium where the organisms will not pass through or around the surface of the cements. That was the particularly interesting part of the paper to me and all I wish to discuss at the present time.

Dr. C. H. Parker, Chicago, Ill. I would like to ask whether the bacteria that the doctor spoke of passing through the cement were of a harmful nature, were they of a destructive nature to the teeth proper?

Dr. Webster. In respect to that, most of the bacteria I found that had passed through the cements were the ordinary pus organisms. I know they were the organisms that cause inflammatory processes.

Dr. N. S. Jenkins, Dresden, Germany. This paper is a very important contribution towards the solution of one of the most important questions of our time. It does not deal with the chemistry of cement, but with its physical characteristics, and I know of no experiments in this direction which are so instructive and suggestive. The first step is to give us views of the various powders so enlarged that we can see that a family resemblance characterizes them, for they differ greatly in the size of the granules, but not so greatly in form. When, however, the powders become mixed with

their fluids the difference becomes more marked. They behave very differently in mixing, and especially the difference in the number of bubbles is very suggestive. Of all the cements those marked *E* and *I* would seem to be most instructive, since they each possess very few large granules, very many medium granules, and few bubbles. *E* has no expansion. *I* has an expansion of four microns, and subsequently to the period of twenty-four hours has still a slight expansion. The adhesiveness of *E* is less than that of *I*, but both of them offer a far greater resistance to moisture than any of the others, with the odds in favor of *I*. The experiments are of great interest, but they are still but a step toward the solution of the problem. We do not know of what the granules are composed, what the crystals are, or how pure the mixing fluid is. Phosphoric acid, which probably entered largely into the composition of the fluid, is notoriously unaddicted to purity. We cannot tell what proportion of dust and dirt had soiled the powders, nor how objectionable in bulk the coloring matter may have been.

From my experience of the extreme difficulty of keeping the material of which porcelain is composed free from foreign and deleterious substances, I feel great compassion for the manufacturers of cements who have been formerly influenced by the general delusion that some granular and resistant matter must be incorporated into cement and who have had special difficulties in obtaining and retaining pure materials. But in spite of all the imperfections of cement, it still remains an indispensable adjunct to inlay work. There are innumerable instances where cement practically fulfills the requirements of Dr. Poundstone's four propositions. Every experienced inlay worker knows that given the exactly made inlay he can in the vast majority of cases so set that inlay that no joint perceptible to the eye and visible disintegration of the cement supervenes. The color of the inlay and cement is preserved and secondary decay is far less frequent than with gold fillings. Moreover, the density and adhesiveness of the cement increase with time. The porcelain inlay which has been in place for ten years is removed with far greater difficulty than one which has been in for ten months. The mixing of any cement is an art. Powder and fluid should be inspected when placed upon the mixing slab, and if found in any way contaminated it should be discarded. Then a small portion of the powder should be thoroughly mixed with the fluid and gradually more powder added until the desired consistence is obtained. Then the inlay and cavity should receive a thin layer and the inlay pressed home. The edges should be freed from overflow, and then the final pressure, which should be firm but not excessive, continued until the cement has begun to crystallize, and the inlay still be kept dry for a time, according to the character of the cement. In the vast majority of cases there will then be a perfect operation, far more secure from accident than any other, and immensely more comfortable to the patient. But, however, we do not know why in the small minority of cases we have failure through weakness of cement. Whoever deliberately sets an ill-fitting inlay deserves to meet with failure, but the most skilful and conscientious man sometimes meets with a disaster which might be rightly attributed to imperfection of the cement. Therefore, these careful and intelligent observations of Dr. Poundstone have for us all a great significance.

Dr. G. T. Epling, Keystone, W. Va. I have observed that cement when mixed on one slab and dropped on another will not adhere to the slab with as great tenacity as that with which it would adhere to the one on which it was mixed. Therefore, when I set an inlay now, after mixing my cement on a perfectly clean slab, adding just a small portion of the powder and thoroughly mixing before adding any more powder, I place some of the cement on the inlay and rub it thoroughly over the surface that will rest against the cavity.

Some of my patients who have been wearing inlays complain that the cement works out around the margins, and, in

my opinion, there is no cement on the market at this time that is free from this fault. When perfection in the preparation of cement is attained, that is, when cement that will not be affected by the secretions of the oral cavity is produced, we then can abandon the inlay and use the cement. No matter how perfectly the inlay fits the cavity, one has to depend upon the cement to hold it in place. The cement problem in inlay work is, therefore, an important one and one that cannot receive too much consideration from porcelain workers.

Dr. J. N. Crouse. I wish simply to speak of the destructibility, or the ease or liability of cement deteriorating before using. What brings this about I do not know, but it seems to be a change in the temperature. So a cement that will do well today, in two weeks from now will be very easily penetrated by moisture, so the anilin will show through in a few days. The same is true of the porcelains, and operators when mixing, if they want a little more powder dip the spatula in the powder, or if they want a little more liquid they dip the spatula in the liquid, and that utterly destroys the quality of the cement. We cannot be too careful about these things. I think the cement ought to be tested from time to time for its solubility.

Dr. W. V-B. Ames, Chicago, Ill. I have not heard the previous discussion, but there are some questions I would like to ask of Dr. Poundstone if I may, if he is here, in regard to the methods of procedure in making the mix in these tests. As I understand it he observed changes for days and weeks under some of those cover glasses, and I would like to know to what consistence this cement was mixed. I understood him to say it was mixed to about the consistence it would be used in setting the inlay, but I would like to ask the doctor to tell us about what he considers that should be, and whether all cements had about the same consistence. I do not realize how it is possible for some of the changes to take place which he described, unless those particular cements were of a very slow-setting variety and were used in more of a fluid form than was justified.

Dr. Poundstone. I always mix each cement as nearly as I can according to the directions given by the manufacturer—to a consistence such that it will not drop from the spatula, but when placed in a heap upon the slab will retain its form. I use a non-corrosive German silver spatula.

Dr. Ames. You have noticed, of course, that there is sometimes a tendency to the formation of gases in cement during mixing, and as the essayist said there is danger of mechanical incorporation of air, but if it is carefully mixed I think there ought to be little danger of the latter sort. However, I can understand that with the use of a steel spatula we would almost necessarily have globules of gas forming from the presence of hydrogen from the action of the acid upon the steel or iron of the spatula. Then it has been noticed, that in some preparations of powder you get these bubbles from the fact that you have in the powder a little metal in a finely divided state, and this metal—zinc or iron—will necessarily give gas globules. You can see the formation of hydrogen during the mix as an effervescence. I have in a very crude way seen where there was gas in cement between two pieces of glass held between the eye and a strong light, and this undoubtedly came from finely divided metal, and will probably account for some of the cases shown by Dr. Poundstone. I cannot reconcile myself to the fact that these changes should take place for weeks, as I got it from the doctor, after the mixing of the cement. It is hard to become reconciled to the fact that there is sufficient mobility of the mass to allow this air or gas to form and change them, as his experiments would show, and I would like to see it worked out further.

Dr. W. I. Jones, Nelsonville, O. I would like to ask Dr. Ames or Dr. Jenkins a question. I have seen the statement made that the fluid phosphoric acid would deteriorate with age. I believe the gentleman made the statement that it would deteriorate after three

months' time. I would like to know whether that is true or not.

Dr. W. I. Brigham, South Framingham, Mass. The essayist speaks of the value of a porcelain filling, he speaks of the durability of a porcelain filling and the little recurrence of decay. The durability of a porcelain filling does not depend on the porcelain. The porcelain forms only a part of the durability. It is upon the compatibility of the porcelain with the cement and the quality of the cement that depends the durability of the filling. The porcelain simply makes it a permanent filling. In cement we naturally have the best filling material if it were durable, and the porcelain simply makes it so. It has been said here that fusible cement may take the place of this and to a certain extent do away with the use of cement for filling, but if you have that fusible cement that filling in the end will have to be cemented in place, and the cement problem will be just as great then, if not greater. The man who has had a great deal of experience in porcelain work will say it is a long time before we shall have a better product. I cannot help thinking what was said by Robert Ingersoll upon one occasion when introducing Henry Ward Beecher. He said, "We have waited a long time for Henry Ward Beecher and we shall wait a long time for another." We have waited a long time for the product of porcelain and we will wait a long time for something better. To my mind the cement is not the greatest problem; the cement problem is only secondary. The preparation of the cavity, to my mind, is of the greatest import. This discussion does not deal with the preparation of cavities, although this is the great factor in the problem. Cavities can be so prepared that fillings there inserted will last for years. As to the value of cement in preventing caries, we know that zinc oxyphosphate has antiseptic qualities, but is soon disintegrated by the fluids of the mouth. I believe that for a long time to come we will have to look for something better than porcelain as a filling material.

Dr. Edwin T. Darby, Philadelphia, Pa. It is undoubtedly true that the cement problem is one of the bugbears in connection with porcelain inlay work. It is generally regarded as the weak point in inlay work; I do not say it is, but it is so regarded by many men in the profession. It has been said, and truthfully said, that no chain is stronger than its weakest link, and they use that argument to say that no inlay is better than the cement with which it is set, but in my judgment almost any of the good cements are sufficient to hold a properly constructed inlay in place, barring accidents, for a number of years, anywhere from five to ten years. I make that statement guardedly, and you will notice I premised it by saying properly constructed inlays. I think many failures are not due to the cement, but to the shape of the cavity or the shape of the inlay. Dr. Jenkins brought out one point, and my object in rising was to emphasize that point, and that is in regard to the mixing of the cement. Many men mix cement for porcelain inlays the same as they mix it for filling, and I contend that the cement used in porcelain work should be mixed with as much care as the most particular and painstaking artist uses in mixing his colors for painting the finest piece of porcelain. You cannot take a solution of phosphoric acid and zinc oxid, drop them on a slab recklessly and get good results. It should be, as Dr. Jenkins suggested, done by gradually incorporating the powder into the liquid, and furthermore it must be thoroughly spatulated. Most of the cements do not set quickly, and an expert can thoroughly incorporate his powder with the liquid and not have it set on his hands. If he has everything at hand in the way of instruments and assistance, the cavity dry, and everything all right and right at hand, he can mix it and mix for a considerable period of time, incorporating the powder with the liquid, and then when the inlay is set the chances are that the porcelain will stay in place as long as a gold filling or anything else. We must not condemn the cements because of our failures, for I think I speak

the truth when I say that very few inlays that are properly constructed and properly cemented in will be affected by the action of the secretions of the mouth upon the cement. I think we are on the verge of a period when there will be great improvement in the character of our cements as there have been improvements along all dental lines, and I think within the next year we shall have cements as good as our porcelain, and that will certainly be good enough.

Dr. POUNDSTONE (closing the discussion). I wish to thank the gentlemen who have taken such an interest in the discussion of this subject. There are a few points I wish either to speak of or to emphasize.

As to the color of the cements tested, in every case where it was possible I used the light yellow powder. There is a difference in the different colored powders from the same manufacturer. I have found that the bubbling is greater in the white, the bluish cast, or the pearl gray than in the yellow powders, which appear to contain no foreign coloring matter. This point needs further investigation before definite conclusions can be arrived at.

In the preparation of the cavity I repeat what I said in my paper, that it is my opinion that most inlays are locked into the cavity by the cement acting as wedge or key. If the cavity is properly prepared the cement will hold the inlay in position for months and years, even though it is not sticking either to the cavity wall or to the inlay. There must be retention enough in the cavity to prevent the inlay from being moved in any direction except that from which it was inserted.

As Dr. Thompson has shown in his contributions on cavity preparation, there is but one way in which an inlay should be set, that is in such a direction that the stress of mastication will have no tendency to dislodge it. If this is done it may not be absolutely necessary that the cement should adhere perfectly to the side of the cavity to retain the inlay in position. If the cement does not perfectly adhere to the cavity wall bacteria will pass between. Dr. Webster has just shown us that these bacteria may not always be harmful, but if harmless bacteria will pass through the way is open for others that may produce pathological conditions.

In regard to the matter of pressure there may be a difference in the setting of some cements under varying degrees of pressure, but I do not believe with Dr. Crouse that expansion is due to and governed by the amount of pressure, for in some cements there is no expansion after being under high pressure, while in others it amounts to as much as 100 per cent.

In regard to grinding the cement powders finer; as has been noted in the measurements there are but few of them in which the largest granules are less than 1/1000 of an inch in diameter. If they can be ground finer I think it safe to predict better results.

The next order of business was a paper entitled "Success and Failure in Operative Dentistry," by Dr. FRANK L. PLATT, San Francisco, Cal., as follows:

SUCCESS AND FAILURE IN OPERATIVE DENTISTRY.

Operative dentistry may be defined as embracing all that portion of dental science not concerned in the replacement of the loss of the natural teeth or the correction of their irregularities. For the purposes of this paper, however, the subject will be confined, so far as success and failure are concerned, to the ordinary and most frequently performed operations of dental surgery.

To properly define failure in any undertaking or application of science it first becomes necessary to decide what constitutes success, for when this has been determined failure is simply its antithesis.

The fundamental object of operative dentistry is the conservation of the natural teeth, either by prophylactic, hygienic and therapeutic measures, or the replacement of lost tissue with crowns or fillings.

The scope and purpose of operative

dentistry being defined, we come at once to the consideration of what constitutes a successful operation.

The teeth under normal conditions, as evidenced in animals and savages leading a natural life, were no doubt primarily intended to perform their various functions throughout the life of their possessor, but as we are considering the teeth of civilized man allowance must be made for the degeneracies resulting from the habits, customs, and institutions of our civilization, for we have so far departed from natural modes of living that few individuals reach the age of maturity, and fewer still reach middle life or old age, without suffering the loss of one or more teeth as a result of dental disease, or without having had recourse to operative dentistry in one or more of its various branches. As it is impossible for the human race to revert again to savagery, or to recover at once its earlier vigor and freedom from disease, so it is equally impossible to remove by any operation the primary cause of degenerate and diseased conditions. We may successfully remove the local and exciting causes of dental disease, or replace with substitutes lost dental tissue, but as we cannot change or modify the diathesis which is the predisposing factor in each individual instance it is only logical to assume that the cause which first led to the disease may cause its recurrence. So, while it is quite possible that the predisposing cause of dental disease may be combated, and in a measure overcome by a continuous course of prophylactic treatment, it is not fair to say that dental operations should last indefinitely, nor is it just to assume that a given operation performed on different patients will give uniform results, for there must always be taken into consideration the predisposing personal diathesis, and also the habits, occupation, temperament, and age of each individual, and the circumstances and conditions governing its performance. As there are, however, certain objects to be attained in every dental operation, such as the relief of pain and the restoration of the usefulness and appearance of the teeth, a successful dental operation may be defined as one which under given conditions is productive of the most nearly ideal results in each individual case.

Under this definition there is at once presented to the mind of the careful, conscientious, thoughtful operator a vast field of study relating to the general and local conditions governing each case presented for treatment, and including the selection, preparation, and use of materials, the condition and adaptability of instruments, and the results it is hoped to achieve by operative procedure. All these considerations are essential to the successful practice of dentistry, and the operator who slights any of them, or adopts methods of empiricism, will sooner or later find he has been courting defeat and failure.

Much has been written on the bacterial origin of caries, on chemical action in the oral cavity, and the effects of habit and environment, but there is another point from which the failure of operations may be viewed, a point with which the dental profession has much to do and which reveals a state of affairs as deplorable as it is unnecessary. Every profession, trade, or general occupation is governed more or less by precedent, but there is no reason why the dental profession should adhere as tenaciously as it does to the unhappy precedents established in its earlier days or which have resulted from the unfortunate application of the rules of trade to a profession which should never have known their influence. The standard of value for dental services should not be fixed, as it too often is, by the cost of the materials employed, but should be in accordance with the actual results of the service rendered and the amount of time and skill required in its performance.

Experience, experiment, and scientific study have established rules for the preparation of cavities, the general principles of which are correct; filling materials have been the subject of countless experiments, and their virtues and failings carefully determined; instruments in almost endless variety have been devised for the preparation of cavities and

the insertion of filling materials; calcareous deposits on the teeth have been the subject of much study, and their origin, chemical constituents, effect on tissue, and removal have been taught and illustrated extensively; artificial crowns in great variety and of varying value have been devised and their manufacture and application have been freely given to the profession; pulp-cavities have been treated and filled in countless millions, by numberless methods and with an endless variety of materials; and the history, development, and application of all these things is free and easily accessible to anyone who will read dental literature. When many men of many minds are interested in a common pursuit there will, of course, be a diversity of opinion regarding the best means of reaching a desired end, but as to the object to be attained and the general principles governing its accomplishment there is usually but little room for argument. Under such conditions it is reasonable to expect fairly uniform results from the operations of men specially trained and educated in all the principles and intricacies of dental surgery, yet our daily experience must lead us to believe that something is lacking in the system of operative dentistry as it is practiced today, for it is undoubtedly true that a large portion of the time of the average practitioner is spent in remedying the untimely failure of operations performed by himself or his contemporaries.

Leaving unconsidered the work of those who fasten their faith on a single method or material, for they are too hopelessly conservative to demand attention in a liberal age, we may study with interest the conditions presented in the mouth of an average patient who has suffered from a variety of dental ills and at the hands of a number of different operators. Here we may find a few fillings of gold or amalgam to which the patient points with pride as he says, "Old Dr. A did that work fifteen years ago, and I guess it's all right yet," a supposition which an examination proves to be correct; and we will further find that the cavities in which these fillings were placed were well prepared, perhaps not just up to the latest ideals of "extension for prevention," or the "prevention of extension," as the case may be, but with firm, smooth margins extending to the extremities of the fissures and compassing all that portion of the tooth involved by caries. We will find also that the fillings were well condensed, a feature which is essential to either gold or amalgam fillings, and they were also well finished.

Further conversation may develop the fact that "The old doctor charged an awful price for his work, but I guess it was worth it," all of which is food for thought as we continue our examination and find gold, amalgam, and oxyphosphate fillings undermined with decay, with rough surfaces and overhanging edges, in imperfectly prepared cavities whose margins have not been sufficiently extended, and from which the carious dentin has not been thoroughly removed.

We may also discover an ill-fitting crown, perhaps brazenly proclaiming its presence on an incisor or canine tooth, and we will undoubtedly find between the upper molars and on the lingual surfaces of the lower teeth rich deposits of calcareous matter and the usual débris of the oral cavity. Inquiry will reveal the fact that the teeth have not been cleaned for many months or even years, though several operators may have been consulted regarding other matters, and that most of the work has been hurriedly and cheaply performed and very obviously with no regard whatever for the established principles of cavity preparation and the proper selection and manipulation of tooth-conserving materials.

The patient will also be found to be almost totally ignorant of the methods and materials to be employed in the proper daily care of the teeth and of an intelligent appreciation of the true value of the various services which have been performed.

This is no idle picture, but one with which all of us are familiar, and it certainly does not bear out the frequent boast of the "wonderful progress" of dental science.

The conditions enumerated disclose the

fact that the operations which succeeded were performed by a careful, conscientious operator, who demanded and received a fee commensurate with his skill and his integrity, and which permitted him to do the work as well as he knew how, while those which failed were executed by those who prostituted their art, their knowledge, and their skill to the god of mammon, and who signally failed in their duty to their patient, their profession and themselves.

It is not the lack of well-established theory or the fact that dental education is difficult to secure, nor is it always the lack of understanding which leads to failure, but it is a lack of moral courage and professional integrity, a lack of sufficient will power to overcome the evil precedents seemingly engendered by an unholy thirst on the part of the public for something cheap and of an equally unholy willingness on the part of the profession to give it to them.

Success cannot be universally attained, nor failure everywhere prevented, but the present condition of too prevalent failure may be modified by teaching our students and the members of our profession not alone the correct principles of operative dentistry, but also the importance of educating the public to an intelligent appreciation of the actual value of skilled services and the part they must take in the care and preservation of their teeth; and above all our colleges, our societies, and our journals should teach that success, intelligence, and integrity walk hand in hand, while failure, falsehood, and deceit are spirits of evil bound together by inseparable ties.

Discussion.

Dr. C. S. Stockton, Newark, N. J. I have sometimes thought, if I were called upon today to decide whether soft foil should be abolished, or cohesive foil should be abolished, and we should have to depend entirely upon one or the other of these materials, soft foil would stay if you had my vote.

Excuse me if I mention something personal. Only a short time since a patient came into my office, and after doing some work I asked "How long has it been since I put these fillings in for you?" There were fourteen gold fillings in her upper front teeth. She thought a moment and said, "Doctor, that was thirty-one years ago." I say, I wish I could have that patient here today and have you gentlemen pass upon those fillings.

In speaking to the point in the paper in regard to the commercial value of our work, it is incomparable; we do not as a rule get enough for our services. There are few callings in life that are so trying, so exhausting. Comparatively few of us when we get to be as gray-haired perhaps as I am, have that accumulation of wealth which the work we render to our patients and to humanity would entitle us.

Another personal instance let me give you, showing, perhaps, that we must have a little discretion in regard to the kind of fillings that we put in. A lady for whom I had done work ever since she was a little girl, married and went to Cleveland. One of her front teeth decayed and gave way. The dentist there put in a very beautiful porcelain filling; it remained in only two weeks. Now if he had filled that tooth with gold, it would have been permanent. The stress was so great that it broke out. I am a great admirer of porcelain; I do some of it when I think it will stand. I am proud of my calling; glad that I have been a dentist and able to help humanity.

Dr. Whitney. I started out from my college fully impressed with the great value of gold. Very soon after graduation I went to Honolulu. There I found a people who had, under the careful advice of a very conscientious man, been taught to greatly appreciate the value of their own teeth; and as he had retired from practice, I entered upon his labors. There was, fortunately, no question asked at that time about what material should be used, its value, or its cost; but I was asked to do everything I knew to preserve their natural teeth. For a young man starting out

these were very favorable circumstances. I had been under the training of that eminent man, Dr. James Truman, and was fortunate enough to have been invited to his house, where he gave us out of his time and energy extra clinics on gold; and thus, though we were not taught the present methods, I started out with something of a system for gold operations. During the first fifteen years I was the only dentist there, and probably knew every white person upon those islands. During the thirty-five years' practice there I have not averaged one plate of artificial denture in a year. Now why is that? Not because of my extra skill, but because I had a class of patients who valued their teeth, and I had only to do my best and use my best efforts to keep them in position. Scarcely a week, perhaps hardly a day, passes that I do not see the gold fillings that I put in thirty-five, thirty, or twenty-five years ago. I see them apparently as good as when they were put in. I can't say this of any other material. I have used, of course, amalgam in all its various manipulations, also cement and gutta-percha, and porcelain inlay. We were taught, in those early days, inlay by cutting out from a selected tooth the form of the cavity and inlaying it. But in all these different operations everything in my hands bears the stamp of gold; and so today my work and my thought is alone in gold operations.

Dr. H. G. Atwater, Los Angeles, Cal. I realize that success—the paper being entitled "Success and Failure"—does not always depend, in fact seldom depends, upon the education of the man, but in the heart that he puts into his work; and I must say that every word uttered in this paper I know to be an expression of Dr. Platt's heart. I have seen his actions, and I have seen his work, and I know that every moment of success he has ever had is due to the fact that he puts his whole heart in his work.

Dr. T. M. Wyatt, Bentonville, Ark. Dr. Palmer's remarks in regard to soft gold struck me very forcibly. I can show fillings that I made thirty years ago of soft gold by hand pressure, and the dark lines that have been referred to are not present. I am a strong advocate of soft gold yet. I use adhesive gold, but always start my fillings with soft, letting it lap over the margins. It would not be hard for me to decide which I would discard; I would drop the cohesive, as use can make soft gold cohesive.

Dr. A. F. Merriman, Jr., Oakland, Cal. One reason I have risen to my feet is that, after such men as Dr. Stockton and Dr. Wyatt, who has just spoken, have paid such high tribute to non-cohesive gold, I feel very much in doubt of that myself after twenty-five years. This morning I gave a clinic demonstrating a combination of cohesive with non-cohesive gold, and I feel after my experience that I am perfectly satisfied that that is the best combination for a gold filling that will last.

Dr. G. T. Epling, Keystone, W. Va. I would like to ask the gentleman from Arkansas, who stated that he began the filling with non-cohesive and completed with cohesive foil, if he extends the soft gold completely to the margins of the cavity?

Dr. Wyatt. It depends on the roots. I work from the enamel, starting it from the side of the cavity.

Dr. Epling. Do you allow the non-cohesive gold to overlap the enamel margins?

Dr. Wyatt. Yes, sir.

Dr. H. T. King, Fremont, Neb. I see the discussion is getting into different materials, soft gold and cohesive gold, and is getting away from what I take to be the main point in the paper, and that is the care, the industry, the energy, and faithful work in the preparation that makes a perfect filling. The gentlemen have given a number of instances of fillings put in twenty-five years ago with soft gold, from which we may infer if they had been done with cohesive gold they would not stand. Now I have fillings in my own mouth put in thirty-one years ago last June, put in with cohesive gold, with a hand mallet, not one bit of hand pressure being used except to fix the first piece in the tooth. The fillings

were made entirely of cohesive gold. I want to say one word in addition, in regard to the term that we use, known as extension for prevention. If it is true that is the proper way to fill teeth, then the gentlemen who filled teeth twenty-five years ago and saved those teeth must necessarily have practiced extension for prevention; but until the time Dr. Black gave us that description, it was known by other names. Marshall H. Webb describes in exact terms the thing that we mean by extension for prevention. If gold is skilfully and carefully packed, whether it be non-cohesive or cohesive gold, a good filling will be the result, one which will save the tooth.

Dr. J. W. O'Kelly, Fort Smith, Ark. I think, after all, the greatest success in preserving the teeth by filling depends largely upon the preparation of the cavity and the material used. Some thirty years ago I filled two teeth with non-cohesive gold foil, using hand pressure, and three or four years ago I saw them and they were in good condition, while a great many I have made since have not lasted that long. I have found from experience that the secret of success in filling operations is in properly preparing the cavity and properly adapting the material to the cavity walls. I believe the greatest number of failures are caused by improper marginal preparation. The peripheral surface, for instance, and the marginal enamel edge should be burnished and polished before filling. Only a few years ago I observed this. In the case of an approximal cavity I remove the decayed tissue, and then with a burnisher I break down the fragile edge all around the marginal surface, then polish well with fine paper disks. This edge sometimes looks to be perfectly sound; but in burnishing it I find I have broken down quite a lot of soft, brittle enamel. Then I take a fine disk and run over the margin to make it smooth. I find when I do this and fill against the margins with non-cohesive gold and condense it thoroughly, that the result is a successful filling.

The secretary, Dr. Geo. E. Hunt, having been called to the chair, Dr. C. N. Johnson, chairman of the section, spoke as follows:

Dr. C. N. Johnson, Chicago, Ill. I had not expected to take part in the discussions of this section, but I am so impressed with the purport of this paper that I beg the privilege of saying a few words. We have heard from this gentleman and that gentleman about fillings—that one lasted so many years, and another lasted so many years. We have heard this method and that method described and commended or condemned as the case may be.

Now I think that success in operative dentistry, or in dentistry generally, depends upon many factors. It is not the material alone, it is not the method alone; it is, most of all, the man himself. Let us take a certain operation—one of these operations we have been speaking about—filling a cavity in a decayed tooth. Success depends not alone upon the preparation of the cavity; but, first of all, upon a thorough study of the conditions and of the causes of that decay in the first instance. It depends upon the recognition of the principles involved in the methods of decay. I was immensely pleased yesterday afternoon with the discussion of this subject on Dr. Miller's paper. All these things which seem to be abstruse and scientific are practical when they are applied properly. It depends upon a study of the environment of the case, the condition not only of that cavity but of that tooth; not only of that tooth but the other teeth in that immediate neighborhood; not only upon the teeth but the gum tissue surrounding the parts; not only that but the condition of the saliva; not only that but the constitutional diathesis.

All these things enter as factors in this question before we ever touch an instrument in the case at all. Then after all that, it depends upon the preparation of the cavity—the placing and proper condensation of the filling material; the integrity of the mass itself; the proper finishing of the filling; and then, more than anything else, as I see it, upon proper instruction to the patient to main-

tain that tooth in a hygienic condition afterwards. In other words, success in dentistry means taking the patient's case into our own hands so far as we can influence that patient and recognize the conditions present, and then so change the conditions that the mouth is rendered immune instead of being susceptible to disease. That, I take it, is success in dentistry.

It gives me the greatest satisfaction to hear these testimonies from these old gray-haired men who have borne the brunt of the development of this profession of ours and who have done service for humanity these many years. I would like to know what other profession gives to humanity the same definite and practical benefit for the same compensation as does the profession of dentistry. *I* do not know of any other.

I may be pardoned for mentioning one case in regard to the efficacy of dental operations properly performed. This has no personal application; I have mentioned it in public before, but I am so proud of it coming from the profession that I mention it every time I get an opportunity. I had in my chair some years ago an old lady more than eighty years of age. She pointed to a gold filling in an upper left lateral incisor, and said, "Doctor, there is a history to that filling. That filling was placed in there before I was twenty years of age." That filling had done service for that good old mother of Israel for more than sixty years. What an accomplishment that was! The dear old soul had even forgotten the name of the man who placed it there; she remembered the circumstance of the filling being inserted, but had forgotten his name. But that made no difference; I metaphorically took off my hat and bowed my brow to the memory of the man who could do that kind of work; and that work was accomplished upon the same principles that you and I try to do good work today. Those principles are involved in close application to the case in hand—concentration of energy in our work day by day, and above all, enthusiastic endeavor to practice dentistry to the highest possibilities of a very high art. I hope that the younger members of the profession will take a lesson from the older men. That is one reason I never fail to introduce an old practitioner, if I can, to the coming generation of dentists. I hope they will take a lesson and go into their work with the same enthusiasm and the same earnest application, and follow it out to the same success that these older men have; and with our increased numbers today, with the widening out of the profession, we can accomplish something for dentistry and for humanity—something that will leave its stamp upon the community to the effect that dentistry is something more than a mere trade.

Dr. Johnson then resumed the chair.

Dr. J. A. Todd, St. Louis, Mo. Dr. Johnson has told all I want to say. I want simply to confirm in his speech the keynote of the whole situation; that is, the care that the patient gives the work. One of my patients has in her mouth seven fillings put in thirty-one years ago, six made with cohesive gold and one with amalgam as black as your hat—all in perfect condition. She is fifty-one years of age, and every one of her teeth is perfect; not a single tooth in her mouth missing or in any wise defective, that is, outside of these gold and amalgam fillings. But she has religiously taken care of her teeth, and if she lives to be a hundred years old and keeps her present mental strength she will have need of no more fillings.

Dr. B. Q. Stevens, Hannibal, Mo. I would not like to let this opportunity pass without saying a word, as I see Dr. Palmer and Dr. Stockton present, and when I think of Drs. Taft, Eames, and Patrick, who have passed away, I feel proud of them and call them my educators. It will be forty-five years the twenty-second of this month (September) since I became a student of dentistry, and I have been a pretty careful watcher of my work. I believe I purchased one of the first diagram books ever published, that of Dr. Allport, issued in 1865, and I have a record of my practice.

We had no cohesive gold, so my prac-

tice up to this time was with soft gold. I could fill a cavity with soft gold that would stay in all right, but it did not look well, as I could not get it full enough. Then cohesive gold was introduced and I could make a beautiful filling, but I found it soon tumbled out. Then I put them both together and I could make a durable filling and one that looked respectable. In large cavities I always use soft gold, tin foil, or amalgam for the first half of my filling, then finish with cohesive gold.

I don't think gold is always the best material to use. We have many compositions now that will save the teeth if you will remove all decomposed material from the cavity and adapt the filling well to the walls. Amalgam should be rubbed in, and when the cavity is half full forced against the walls with a piece of cotton or bibulous paper. The cements should be given time to adhere while soft. The cavity should be dry for cements, but it is immaterial with amalgam.

And finally I want to impress upon the minds of our young men that it is not the filling material that saves the tooth, but the judgment one uses in selecting the material, and the man that inserts it.

Dr. W. J. Taylor, Sacramento, Cal. The title of the paper, "Success and Failure in Dentistry," I believe, can be summed up on the one side by certain remarks, and on the other by remarks diametrically opposed. I think the successes in operative dentistry can be summed up as follows: First, in proper preparation of the mouth and the oral tissues before operating upon any particular tooth. Second, the obtaining of proper separation before attempting to put in the filling. Third, the proper preparation of the cavity for the introduction of such filling as may be selected. Fourth, the proper introduction of the filling material selected. Fifth, the proper occlusion of the filling after its insertion. Sixth, the best finish that it is possible to give any particular material which is used for the filling. I don't believe one can finish or polish any filling too much; we all know that the débris of the mouth will glide more easily over a smooth surface than over a rough one. Seventh, keeping the mouth in a hygienic condition after the introduction of the filling. All of the foregoing to be successful must be backed up by the enthusiasm and the conscience of the individual operator, irrespective of the person for whom the operation is performed and irrespective of the fee which is charged. If we cannot do the work so that we have a self-consciousness that the work has been done to the best of our ability, I believe it is better for us not to do it and to send the patient to some other operator.

Dr. C. L. Boyd, Montgomery, Ala. There is one point in connection with this matter of success or failure in dental operations that I believe has not been touched on, that is the handling of the patient. Now I have seen defective fillings inserted by operators who as a rule do excellent work, and it was because in those cases they were unable to properly manipulate the filling materials, owing to the fact that they could not control the patients. That is one point; but there is another and a very important one that I likewise would call to your attention, namely, the adaptation of the material, half way, we will say, from the cervical to the grinding surface, at the margins, or just under the margins, a point along which we want to anchor the material which is being used. I have seen failures at these points, or leaks, whereas at other points, at the cervical margin and at the grinding surface, and at all other points, the fillings were entirely good, no discoloration at all. Now my idea is that we all at times fail to adapt the material closely to the margins at these points, whereas at the cervical margin and at the finishing up of the grinding surface we adapt it very much more perfectly, and therefore get better results. I think that many operators lose fillings more from leaks half way from the cervical margin to the grinding surface than from defects in their fillings at the cervical margins. Success, gentlemen, depends largely, too,

on an intelligent and proper care of the teeth and gums by the recipient.

Dr. W. KASSAB, Chester, Pa. After listening to the essay and the discussion, and later to the discussion by Dr. Johnson where he asks the younger men to take lessons from the older ones, it brought to me the thought of my own work and the question whether it is going to stand the test of thirty years or not. I have to confess that I do not expect some of my fillings to last thirty years. I expect *some* of them to last that long—some amalgam and some gold—but some I do not expect to last that long; and the question comes to me now, Is it because I am doing inferior work, or is it because I do not work upon the same principles that these older men do, or is the percentage of their fillings which lasted that long greater than mine? That is one thing I would like to settle with my conscience. Some of these fillings put in thirty and thirty-five years ago have lasted all this time, but how many? Then again, we seem to consider every method that we use in every aspect except that of regard for the feelings of our patients. With some patients we can do work that will last thirty to sixty years; with others we cannot. Some patients will allow us to go on and do the work in that careful and thorough manner which is so necessary to insure success; while other patients will not, on account of their sensitiveness to pain or some other reason—simply will not permit us to do work that will last more than a few years at best.

Dr. H. L. AMBLER, Cleveland, Ohio. Upstairs in this building, in the educational department, in a case, may be seen a human tooth which has three fillings in it made of tin foil, and the tooth was worn in the mouth for thirty years and there is no decay around the tin filling. A gentleman who is sitting on the stage at this moment showed me a few years ago a tin filling which had done good service in the mouth for forty years. Dr. E. A. Bogue of New York, to whom the president so kindly and feelingly referred two days since, gave me a record of a well-authenticated case of a tooth that had been filled sixty years with tin foil and worn in the mouth and had no caries around the filling.

Dr. GEORGE E. DANIELS, San Francisco, Cal. We have all been discussing methods and materials, but it seems to me there is one important phase of the subject which we have failed to recognize. We oftentimes use our utmost skill and ability, use the very best material which in our judgment will save the teeth, but we do not have the full cooperation of the patient. We lose sight of the fact that we must have his cooperation. Many patients will hinder us; they are timid, they are afraid; they perhaps do not have enough confidence in our ability to perform that particular operation, or in some way they impede our progress and thereby render that operation a failure.

Dr. S. MOYER, Galt, Ont. Someone has said, "Success in life means to do one's best." I believe that applies especially to the practice of dentistry; and in order to do one's best in dentistry three things are necessary: First, education; by that I mean dental education and all the other education that we can get. That education will come in various ways—by reading, reflection, and discussion, and all those many ways that you know of. Second, manipulative skill; and third, conscience. Now with those three equipments, education, skill, and conscience, a man will be a success; that is, he will do his best. One cannot do his best without intelligence, education, and manipulative skill; and lastly, the operator must be a conscientious man. At some time or other I have failed in each one of these three; sometimes from a lack of conscience, or at any rate a want of sufficient care. I believe these old gentlemen we have heard from today have achieved their success because of a good education combined with manipulative skill, and a conscience back of it all which urged them on to do their very best.

Dr. WHITNEY. Excuse me for making one more remark. The gentlemen here from California may remember a paper read before the State Dental Association on the subject of "Gold *vs.* Amalgam,"

in which it was stated that having placed my ledger and record books into the hands of a bookkeeper, the personal equation might be eliminated. He was asked to take at random the names of twenty-one persons who had been under my care so far as I knew for twenty-one consecutive years, and follow each filling through the whole term of years and give me the result. After the conclusion of his labors he stated that not more than five per cent. of gold fillings had failed and been replaced within the twenty-one years.

Dr. STOCKTON. Dr. Whitney has hit the nail on the head; so did the gentleman who spoke a moment ago; it is the environment of the filling that very largely has to do with success. Just take an instance in the practice of old Dr. Waters of Boston. A young man asked him to examine his teeth; he did so, and made this remark, "Your teeth are not fit to be touched with a pair of tongs," and dismissed him. A few years after that, a gentleman presented himself to Dr. Waters to have his teeth examined. The doctor carefully examined them. Said he, "There is nothing the matter with your teeth; they are the finest set of teeth I ever saw, and in the most perfect condition. The care you have given to your teeth is simply marvelous; I never saw such a fine set." "You think you never saw my teeth before?" "No, sir; I never saw your teeth before." "Are you sure, doctor, that you never did?" "Yes, I am very sure I never saw your teeth before, nor have I ever seen so fine a set of teeth." Then the gentleman recalled the instance of a few years before "when you said to me that my teeth were not fit to be touched with a pair of tongs." That was a lesson for me, and I have never forgotten it. It is very largely the environment which affects the teeth one way or the other. Fillings will come out, and is it a wonder, considering the lack of proper care on the part of patients? Is there anything more perfectly shaped than the teeth to avoid decay and destruction? Yet they do decay, and largely because of the lack of proper care. And I say to my patients sometimes when they come back—and I speak rather unkindly perhaps—"Why don't you complain of the Creator who made them? I did the best I could, but I only patched it, and if you had taken half the care that you should of the work that I did, or the work that your Creator did for you, your teeth would have been saved." Let us impress upon our patients that the great point in saving the teeth is to keep the teeth in proper condition after they are filled. Tell them they had better go out and throw their money into the river or into the street, unless they make up their minds to take care of their teeth, for otherwise the fillings will be a failure.

The CHAIRMAN. Now, ladies and gentlemen, Dr. Palmer has consented to say a few words to you—Dr. Corydon Palmer, one of the patriarchs of the profession. (Applause.)

Dr. CORYDON PALMER, Warren, Ohio. This subject is the one I feel most interest in, and always have; I consider it the vital principle in our profession. I want to say to you that I have been around and looked carefully over everything—looked carefully at the clinics and especially at the making of gold fillings; and according to my long experience and observation and what I have tried sometimes to teach, I found that there ought to be a reform in the manner of introducing gold into the teeth, especially the incisor teeth. I saw the clinicians introducing the gold with a single round point—a straight instrument—working in one direction only and without making any lateral condensation against the sides of the cavity, proceeding in that manner to build up a tooth and perhaps the broken-off corner of an incisor. I have been accused sometimes of being dogmatic, but I am going to try the other way this time and say in all kindness that I wish operators would get in the way of employing properly shaped instruments to introduce the gold, so as to make it possible to shift the instrument to one angle and to the other of the cavity, and carry the gold into the undercuts and against the labial thin wall where it is liable to show and be defective. Do the

work carefully, and do not operate with an instrument that is seven inches long, nor stand off from the work and have somebody to mallet the gold who does not see or understand the technique of the work. I want to ask you to get into the habit of shifting the instruments across the cavity, carrying the gold into the angles and against the under side of the labial wall. Fine instruments with which to condense the gold laterally should be used. Do not fill beyond the cervical border before it has been properly finished, so that it will not require any further treatment after the packing is completed. Gold is not well condensed by just carrying it in one direction with the instrument; it must be condensed laterally as well as vertically. I do everything myself, with the mallet in my own hands—always have—and I use short instruments, so that I can see what I am doing, and endeavor to do a fine thing like an artist ought. Do not get into the way of putting all this mess of stuff in a cavity—cement or tin foil at the bottom, and then non-cohesive gold on top of that, and then cohesive gold. They do not make good operations. If non-cohesive gold is used to begin the filling without being careful to properly condense it, and then cohesive gold is adapted on top of it, it will not result in a good piece of work, as such a foundation is not a safe one.

Now, I would like you to make a good, clean foundation; begin with your cohesive gold—not necessarily the most cohesive kind, that will harden too quickly; get the filling started so it will not move, and then lay the gold across the cervical border; for there is where the failure occurs. Burnish the gold against the cervical wall, and instead of working in one direction only use instruments with which it will be possible to apply the condensing force in all directions. Lay the pieces on with a flat, serrated instrument, for that will make a smoother and handsomer finish than by trying to complete the filling with a straight point on the automatic mallet. I never put a machine on a tooth in my life; I never had such a thing by me—never did. The operations and fillings that I have seen made here look well; they finish up to look well. They spent a good deal of time with those little disks smoothing them up, but they could do better if they would work in the way that I speak of. (Applause.)

The Chairman. I want to find out how long Dr. Palmer has been in the practice of dentistry. How long have you practiced, doctor?

Dr. Palmer. Since 1839.

The Chairman. I beg the audience to rise to their feet before we adjourn, as a token of respect to this aged practitioner.

The entire audience then rose with applause, to which Dr. Palmer responded with a bow and "I thank you."

The session was then adjourned until Friday, September 2d, at 2.30 P.M.

Fifth Day—Friday, September 2.

The section was called to order at 2.30 P.M. by the chairman, Dr. Johnson. The first order of business was the reading of a paper entitled "Use of the Matrix for Tooth-Restoration," by Garrett Newkirk, M.D., Los Angeles, Cal., as follows:

Use of the Matrix for Tooth-Restoration.

We talk too much and too indiscriminately to our patients and to students about *filling* teeth. Instead of filling, a part of the English-speaking race employ the term *stopping*.

The road-mender *fills* up holes with broken stone. The baker *fills* a crust with apples, pumpkin, or cherries, and after annealing calls the product *pie*. The apothecary *fills* a bottle with a liquid invention of Satan, and *stops* it with a cork. A railroad gang *fills* the approach to a bridge where the hold-up gang may later *stop* a train.

It might be well if we could fill our minds with correct ideas, and stop the abuse of terms in dentistry. We all know that many things we say are ety-

mologically if not logically absurd, but we go on repeating them, and shall no doubt to the end of our chapter.

We say we fill a tooth. Do we? Certainly in a sense we fill simple cavities. In a sense we stop them from the ingress of air and fluids. But suppose that the cavity is not simple. There is not a hole merely, but an extensive breaking down. Suppose a cyclone strikes a house or a shell explodes therein, knocking out one end. Suppose that in Africa half a house is honeycombed by the insidious white ant. There is not merely a broken window or a hole in the wall. In either case, the house is in part a ruin. The hole could be *filled* or *stopped,* but the broken-down house would have to be rebuilt—restored.

That is what we are called upon to do continually—to build up and to restore, not of the same materials but a substitute. The comparison fails in this, however, that the house, new or old, is hollow, while our building is quite solid; it is more like the restoration of a broken monument of cement and stone, badly shaken by an earthquake.

The tooth is not a hollow thing like a glass jar which the mother fills with jam whereby to test the honesty and self-restraint of her small boy. No, indeed. It is a piece of masonry, broken down, whereto we add, if the foundation be sufficient, that which shall keep it in perpetuity, so we hope, during the lifetime of its owner.

The restoration of these broken monuments is no simple problem. The longer we are engaged in the work, the more we realize the fact. It involves a careful and continuous study of curved lines. None of the monumental forms are square or rectangular. They possess no straight lines and no plane surfaces. For every thirty-two there are sixteen forms. But the forms on separate sides are not always duplicated, and they are always reversed in position, making different studies for the workman. But more than this, you may observe and study ten thousand sets of those dental forms; they will be divisible into types and classes, but no two sets will be alike. To all general rules there are numerous exceptions.

Our problem, be it remembered, is not alone the restoration of a form. It is not limited to a study of the one broken building. Each body of ivory and bone stands in immediate relationship with two others; except that the monuments to wisdom have but one. Those stand at the end of each row, often inclined like the leaning tower of Pisa, but not so tall. This relationship of the monuments one to another is of great importance. They were not built originally for commemoration. They were not inscribed, but are often defaced. They are commemorative in a sense, and they may be ornamental, but their chief reason of being is for *use.* In this use and service they act not independently, but together.

In each restoration that we undertake we have to consider, first, a firm foundation, a good dovetailing of the part we add; second, a touching surface with the next building near the roof, so that the watershed is lateral, not between; third, a free ground space for gums, not vegetation.

Dropping metaphors, we will now speak of teeth as teeth. Each one has not only the double contact noted with its fellows of the same row, but a double relationship in normal articulation with those opposite, above or below. The point of approximal contact must be as a rule close and snug, only that a piece of silk floss will pass by the natural separation of the teeth under moderate pressure. This ideal condition is reached by slight over-building, careful experiment in finishing, and determined usually by an audible click when the thread passes the contact point. As a general rule, not always, the value of our building is conserved by a restoration of the original form of the tooth. But there are exceptions, where previous losses and abnormal spaces require variation, more or less. It is a question of conditions in the individual case and of forces present. There are mouths wherein irregularities —some by inheritance, some by accident, others by bad dental practice—have so disturbed relations that special and un-

usual forms of building are required to secure the best results.

I am now to consider briefly the use of the matrix for tooth restoration, according to the principle above stated.

What is the dental matrix? Essentially, a temporary wall placed for the support of building material that is more or less soft or yielding. The builder of a concrete walk or wall uses boards to hold his material in form till it hardens.

The office of the matrix is threefold:

First, to serve as a wall of resistance, so that under pressure the building material may be thoroughly condensed and joined to the tooth.

Second, to give the general shape of restoration, with an excess of material—for the final form must be given in the later finishing. It is only in a general way, approximately, that the concavity of the matrix can represent the convexity of the completed part.

Third, for all plastic materials that require more or less time to grow hard, the matrix is kept in position till the new body can stand alone without danger of breakage.

MATERIALS AND FORMS OF THE MATRIX.

The ideal material is that combining the most strength with thinness and spring temper. It is now the consensus of opinion that no other material possesses so many excellences as rolled or hammered steel. Rolled or sheet steel, cut into ribbons, is best adapted to general use, being uniform in thickness and convenient. Tinned copper or German silver, rolled thin, are practicable materials for band matrices, being easily measured and soldered to fit special cases; for example, where the greater part of a molar or bicuspid crown is to be built up with amalgam, and wherever it is necessary to have the whole base encircled. In such cases it is not possible to get the best adaptation of the supporting wall without making a matrix for the one in hand.

For the restorations we are most commonly called upon to make, namely, the whole of an approximating wall with more or less of the occlusal, I do not consider the band matrix an ideal form. It is better than none, as "hand-me-downs" are better than no clothes at all, but not of the highest type. The ready-made band which passes all about the crown of a tooth is essentially the section of a cylinder. True, it may be sprung this way or that to change its diameters, but the circumference of its openings remains practically the same. A tooth-form has no relation to it, and we are trying to restore tooth *forms,* not those of washtubs or tin cans.

Nearly always a band matrix made to order for the case in hand will have its basal circumference smallest, and will have to be disjointed or cut for removal. The body it incloses should hold it fast. The smaller diameter cannot pass over the greater.

A solid band matrix to be used and removed entire must be of necessity too large in its rootwise circumference or too small at the crown. If large enough to provide for the approximal contact point, it must project far into the interproximal space. There is a gap left at the cervical base between the matrix and the tooth.

Theoretically, we are told that this condition is remedied by a wedge of wood, steel, or gutta-percha at the cervical margin. Practically, it cannot be done satisfactorily. It is a confession of unfitness. It is what our carpenters call a "Dutchman"—a wedge used to brace up an erroneous gap. Being of Dutch extraction myself, I may use the illustration.

How does it work? An attempt is made to force the steel forward at the crown and backward at the root. It resists at both places and the resistance reaches all around the band. Practically, in the majority of cases, the operator does *not* attempt the wedge. He fills to the matrix as it is; the material is projecting and ragged at the cervical base. He tries to smooth it down when it is half set after removing the matrix, or he leaves it till another time. Then he tries to cut it away with chisels, files, or corundum strips, lacerating the gums

and feelings of the patient; or he forgets all about it and leaves the ragged ledge, like King Henry's brow, "o'erhanging its confounded base."

Perhaps the most serious objection has not been clearly stated. The edge of the matrix, when it is carried in at the first, should pass close to the tooth, between the tooth and the gum. It cannot be at first forced down midway upon the soft tissues and afterward wedged to position without injury. It should go at once where it is to stay.

The straight band matrix, jointed with screws and clamps, has an advantage, of course, over the fixed form. But every form of band matrix has this inevitable disadvantage. It comes short of the ideal in that it requires for itself the use of a second interproximal space. This involves often much difficulty of adjustment, with annoyance and loss of time; and it takes up just so much of space which is sometimes precious. It is where it is not needed and where it ought not to be. But it has continued to go there for many years on the plea of necessity that the matrix must have a rigid base of support. This apparent necessity no longer exists.

There is a man in Philadelphia who seems at times to be heaven-inspired, although he has a hard name. It is Ivory. He knew that a matrix ought to go where it was needed, not where it was a detriment and in the way. In a dream, a vision of the night, he saw a marvelous instrument, and in his waking hours, with any amount of toil, he made his dream come true.

I know of no combination of mechanical principles in dental appliances that appeals more to my appreciation, not excepting the Perry separator. By the nicest adjustment of screw, lever, spring, and clutch, in a combination that it seems to me no other man could have imagined, the matrix finds its support along the opposing inclined planes of the tooth itself. When I discovered this instrument less than three years ago, I cried *Eureka!* And I have been crying it every day since. I have use for other forms of matrices, occasionally, but in the great majority of cases the Ivory matrix and its holder are a close approach to perfection.

A form of matrix which I cannot recommend is one widely advertised—a double matrix, consisting practically of two segments backed together and used for building up two walls at once in separate teeth. It seems to me that the principle is wrong—that one tooth should first be restored and finished, the other at a later sitting. With a quick-setting amalgam or cement, if haste were called for, the second filling could be inserted half an hour later. But one tooth at a time. Why? The teeth are not immobile, each moves slightly with any exercise of force upon it. The matrix should be fixed firmly to the tooth that is being operated upon. In the double form it is fixed to neither one nor the other. In the insertion of a single filling the material and the tooth move together as one body, and the former is in nowise disturbed. But with two teeth at once, each possessing independent motion, the material will surely be disturbed. The method is unscientific. Aside from these considerations, it is generally desirable to wedge the teeth apart slightly with gutta-percha, which is also the temporary filling during the interval between the first and second operations.

A valuable instrument for occasional use where the application of other forms would be difficult or quite impossible, is the "hand" matrix so called I suppose because it is connected with a handle and controlled directly by the hand. Those made by myself I find the most satisfactory. Anybody can make one easily. Take any old instrument that has a sufficient body of steel for the blade—a spatula or thick chisel, for example; heat and hammer, heat and hammer, till you get it down thin. If you hammer enough you will make it tough; it will have a good spring and yet may be bent to any desired curve. No file should be used on it unless it be one that is fine and well worn.

For use, with everything in readiness for quick filling, the matrix blade is placed in position and held by the left

hand of the operator. It is seldom that an assistant can manage it well. The handle is given a strong twist, so that the rootward edge is held firmly up to the cervical margin of the cavity. The opposite edge is held with equal firmness against the crown of the approximating tooth. If either or both of the teeth are at all movable a considerable separation may be obtained by this steady twist of the handle. A sense of firm resistance, too, will be experienced while pressing the material home. The separation obtained will be equal at least to the thickness of the blade, so that when it is withdrawn there will be the close contact desired.

For restoring the disto-occlusal walls of a second molar where it is sometimes impracticable to apply the dam, where the work were better done quickly, and for incisors in making large restorations with cement, the hand matrix is a very useful instrument.

A FEW DETAILS AS TO MANIPULATION.

Success with the matrix often depends very much on previous preparation. Deep-seated cavities are frequently bordered by swollen, sometimes overhanging gums. It is nearly always better, after a free opening and more or less of preparation, to let these carry a filling of gutta-percha for days or even weeks. It is not unusual with me to have in one mouth six or eight of these gutta-percha filled cavities waiting for the matrix and restoration.

Before placing the matrix for an operation, if there is any doubt of its fitness it should be tried in tentatively to ascertain whether it will pass, as it should, close to the tooth wall and not upon the gum. Sometimes an ill-fitting matrix may be fairly adapted by pinching in the cervical edge with pliers. The Ivory matrices, however, are so shaped and may be so inclined in their introduction that they go to the right place easily in most cases.

INTRODUCTION OF FILLING.

As a rule, I believe the matrix that is governed by any screw force should not be completely tightened at the beginning, whatever the material used, but should be after insertion of a third to one-half of the filling. And without doubt we may say that the great majority of operators do not take sufficient pains with that same first one-third. Of amalgam altogether too much is likely to be placed in the cavity at the start. Smaller pieces should be introduced at first and thoroughly condensed with smooth instruments all along the cervical wall and its junction with the matrix. This takes so much time with me that often a second mix of quick-setting amalgam is required to complete the operation. Often with extra dry alloy I have my assistant use the mallet.

In the second half or last third of the filling, whatever the material employed may be, enough force should be exerted against the matrix to induce separation of the teeth by a space not less but more than the thickness of the band. If the teeth have been prepared by gutta-percha wedging, as above suggested, this necessary crowding apart is an easy matter. As before stated, there ought to be an excess of the new material to allow for final shaping, and there ought to be likewise a separation of the teeth at the completion of the filling beyond the normal. This to allow the final contact point to come slightly below and away from the border of the occlusal surface, as it ought, otherwise the contact point is a mere edge continuous with the occlusal surface, instead of being the rounded, finished knuckle of nature's plan.

There would be an improvement at this point, no doubt, if we were all to take the pains to make in each matrix a sufficient concavity, as we might with contour pliers, to bring the filling nearer to the ideal form. As it is, with any common form of matrix, the filling as the band leaves it shows only a straight profile from the cervical to the occlusal edge. Every contoured matrix, however, would have to be left in position till the filling should be perfectly set. It could not be easily removed, like the straight band.

MATRIX REMOVAL.

With amalgam there are, as we know, advantages to be gained by leaving the matrix *in situ* till the material has become hard. In many cases it is necessary where the reconstruction has been extensive and the basal support relatively weak. The specially made band matrix of true form must be so left. But on the other hand, there is something to be gained by immediate removal. This is one of the advantages of an open matrix like the Ivory. When the clutch is loosened it lets go. It is readily straightened, being flexible, and touches the teeth only at the point of contact. With the lightly oiled surface a band should always have it is easily removed by gentle manipulation. Then, with a properly shaped blade, half knife, half burnisher, a trimming and close condensation of the material may be made all along the edges. I believe that perfect borders can be made in this manner with greater certainty than is possible otherwise.

The matrix is an indispensable instrument, but it has one inseparable disadvantage. We must acknowledge the truth that in relation to certain important margins we are working in the dark. There is no man living who can insert a matrix filling and leave it with the same mental certainty as to the integrity of all margins that he would have by visual or tactile exploration of those same margins.

And this brings me to the question that I wish to consider briefly in closing.

EMPLOYMENT OF THE MATRIX FOR GOLD RESTORATIONS.

Undoubtedly there are a few operators who can apply the matrix to a deep-seated cavity and make good fillings from start to finish. But I believe that in general it involves a good deal of risk. I am frequently called on to renew or repair fillings that I have reason to think were so inserted, that have failed at the cervical or cervico-buccal or cervico-lingual borders. I find others that are spongy, or pitted, or grooved in those places.

We know what the bevel of a margin should be for gold; we know that for the proper condensation of gold over such a margin an adapted instrument must have *free play*. We know that it is better to have visual as well as mechanical access to the lines involved. If we have a loose adjustment of the matrix along the border, of what use is it? It is likely to crowd unduly on the gum tissue, to draw on the edge of the dam, and induce leakage. If it is *closely* adjusted, the matrix with the margin forms a sharp, acute angle into which the gold must be forced accurately and condensed, or else there is a weak line of union. I repeat that it is risky. You do not know with the same degree of certainty that you would without the matrix. If science be knowledge the method is unscientific.

But after a body of gold has been placed along the basal margin and angles, then the matrix may be placed and of service as a guide to the general form of building, and of value especially for the full extension and thorough condensation of the "knuckle" at the contact point.

As a last word, I do not remember to have seen a recommendation of the matrix in connection with gutta-percha fillings. Aside from those cases where it is necessary to crowd away the gum for a subsequent operation, the margin of a gutta-percha filling should be carefully made like any other. Patients suffer much discomfort and sometimes real injury from carelessly made gutta-percha fillings. A matrix, especially the "hand" form, is here valuable. It is better to make the filling of form to begin with than to crowd in an ill-defined mass to be trimmed up afterward. If this be done by warm instruments the heat is likely to cause pain or discomfort, and it is not easy to do the work well with sharp and cold blades.

If you have not tried the matrix for gutta-percha, you will thank me for the suggestion when you do try it.

Discussion.

Dr. J. M. WHITNEY, Honolulu, Hawaii. All must agree with the proposition that

for plastic fillings the matrix is almost indispensable. Our only disagreement lies in its use for gold. I think the cause of this lies chiefly in the different ways in which operators prepare the cavity, and in the shape of the instruments employed in filling. We must ever bear in mind that the cavity is to be filled by the use of the matrix. Its cervical portion should be at right angles to the tooth; its lingual and buccal sides carved well beyond the zone of danger and made flat—that is, not grooved or undercut, with the borders cut to an obtuse angle. Cut from thin rolled steel a strip of proper width, curve it to form proper contour, and with a matrix holder—such as Ivory's or one regulated with screw and wrench, having two double inclined sides with lower points extending considerably beyond the upper—screw it firmly between the teeth until you obtain the proper width for the contour, if the teeth have not previously been separated. Lay the foundation of the filling with soft gold; mallet with a large flat-surfaced plugger, afterward with small flat surface. Begin with cohesive, using for borders small round-faced plugger (Royce's most nearly meet the requirements), being sure that the instrument carries the gold directly before it to the outer border where it strikes the curve of the matrix.

Our essayist says never use the matrix in but one tooth at a time. Now, with regard to this point, my invariable practice for the last fifteen years and more has been, where both approximal surfaces are defective, to prepare each tooth as before described, placing two curved matrices between them, and screwing the matrix holder firmly to place. This thoroughly protects the gingival space. Build gold or whatever material be used evenly in each tooth, giving each just the desired contour. These have been to me my most satisfactory operations. On removing the matrices be careful to see that the cervical borders are trimmed, which in my hands is best done by a thin, sharp instrument, that cuts off any projecting gold much more satisfactorily than carborundum tape. The remainder of the filling or fillings are easily and quickly finished with the usual tape. If any danger exists of flattening the contour, place a Perry separator and open a trifle. I have failed to see any serious objection to the use of the matrix when gold is to be employed as the filling material.

Dr. H. W. Arthur, Pittsburg, Pa. Having advocated the use of matrices of one form and another for years, I have been especially interested in knowing how the practice could be so summarily disposed of as the title of this paper would indicate. We are told "it is a dream." The form of matrix that will simplify the filling of cavities on the approximal surfaces of bicuspids and molars is most in demand. There is a difference of opinion as to whether a matrix should be rigid or flexible, or as to whether it should be closely wedged to the margins.

My practice has been to use a flexible piece of sheet steel, about 24 gage, shaping it so that it would not impinge on the gum tissue to the buccal or lingual surfaces, extending well beyond the margin at the cervical border and around the embrasure of the tooth to the buccal and lingual surfaces, with a lip bent over to rest on the marginal ridge, mesial or distal, as the case may be, of the approximating tooth. My practice is to wedge the matrix close to the margins at the cervical third, having it more or less free at the middle and occlusal thirds. The wedging may be accomplished with the "dream" of the author of this paper, or with simple orange-wood properly shaped and slightly moistened with sandarac varnish. I contend for this practice that the filling material can be adapted with such exactness at the cervical third that it will require but little more than a strip and trimmer to complete the operation at that point. The yielding of the matrix middle and occlusal thirds assures contour and approximal contact without special wedging. The buccal and lingual margins above the cervical third can be readily approached for finishing the contour and approximal contact. The holes punched in the buccal and lingual wings of the matrix afford a ready means for removing the tightly wedged matrix. The

lip resting on the marginal ridge prevents rocking, also the driving of the matrix on to the gum.

Dr. A. F. MERRIMAN, Oakland, Cal. We see cases where it is necessary to wedge the matrix, and in other cases where we use cohesive gold it is better to allow a slight giving of the matrix, so that before the matrix is removed it will be possible to burnish the gold around the borders of the cavity.

In the condensation of the gold we should begin at the center and work toward the periphery. In many cases where we have not had the opportunity to watch our patients carefully we find, because of failure to use the proper instrument, after the matrix is removed and the burnishing accomplished that it becomes necessary to wedge again in order to get separation to complete the filling.

Dr. W. KASSAB, Chester, Pa. I would like to speak more with reference to amalgam than to gold. My experience with gold has not been so successful. About three years ago I had an amalgam filling placed in a lower molar in the approximal surface, and the matrix was used with a wedge. While I was having the filling inserted the thought came to my mind, Instead of having one wedge on one side why not have two wedges, one on each side? and I therefore used the Ivory separator, the one that has two fingers; the end of each is shaped like a wedge. I placed it between the matrix and the adjoining tooth and wedged it a little, and I have since come across nothing that has answered my purpose so well; I have become very enthusiastic over it and wish others would try it. It may cause the patient a little pain, but if you will whisper to him that it will make a much better filling, and with the steady pressure that is exerted, the patient will forget the pain. Before taking the matrix out it should be pressed against the filling all around the edges, then with two fingers it can be removed without injuring the filling.

Dr. JOHN I. HART, New York, N. Y. The instrument described by Dr. Whitney has been also suggested by Dr. Dickinson. I have used that instrument, and I think it but right to call the attention of this body to it. The Dickinson instrument wedges the teeth to be filled to quite an extent, so that it produces practically a "knuckling" of the filling against the tooth immediately next to the one that is to be filled. There is little if any pain in the placing of the matrix, and it holds it in firm contact with the tooth that is being filled. The essayist suggested not screwing the matrix at the start as tight as he does later in the operation, and that is the only point I find to criticize in the paper. I think if there is any time when we should have the matrix in close proximity with the tooth to be filled, it is at the time we are filling around the cervical portion of the cavity. I think after that there may be no objection to slightly relaxing pressure, but at the start of the filling I believe the matrix should be placed as firmly as possible.

I think the discussion of this subject would not be complete without referring to the matrix suggested by J. F. H. Hodson of New York city, which permits of knuckling a filling as probably no other matrix will do. It consists of a strip of thin steel from which the temper is removed, and while in this soft state it is struck a few times with a round, smooth instrument which "oranges" the matrix, as the doctor describes it, and gives it a rounded surface similar to that we see on an orange. Two holes are then punched in the steel margins or smooth parts so that it may be readily engaged for removal and the matrix placed in position. If there is an adjoining tooth it is held firmly, but if it is not as tight as I desire at the cervical portion, that can be fastened or wedged. This form of matrix permits the shaping of the matrix for every operation.

Dr. N. A. NEELEY, Christchurch, New Zealand. I would like to explain a little wedge I use with the matrix. I take a piece of steel, about 30 gage, cut a strip about two lines in width, and bend it into a V shape; with this I wedge the matrix on one side where it strikes the adjoining tooth, and with the other I wedge the matrix in position. In this way I hold

the matrix firmly in position. Of course, in different positions I would use a different thickness of steel, but usually it separates the teeth considerably.

Dr. Newkirk not being present to close the discussion, the subject was passed, and the chairman called for the next paper on the program, entitled "Tin-Cement and Sponge Tin: Two New Filling Materials and Their Use," by Dr. ARTHUR SCHEUER, Teplitz, Bohemia, Austria. [This paper is printed at page 805 of the present issue of the COSMOS.]

Discussion.

Dr. W. V-B. AMES, Chicago, Ill. In view of the fact that the essayist has furnished no data or experiments, I will pass around a bottle containing precipitate of tin, such as is described by Dr. Scheuer. He describes the tin as a precipitate. It is a powder of various grades, from a fine powder up to a crystal. In the mixture of such tin with the powder and oxyphosphate, the coarser tin, being in thin laminæ, would break into powder.

On being asked to discuss this paper I inferred from the title that the doctor had discovered some means of producing an oxyphosphate with tin oxid. This was the meaning conveyed, and it rather startled me, because I had gone through all the experiments possible with tin oxid without getting any result, so I found my task easy in discussing this paper when I found he simply meant a mixture of metallic tin and zinc oxid. I have gone through many attempts in the way of mixing such materials as this precipitated tin with oxyphosphate for this very purpose, and I must say with promising results. When I was practicing dentistry more than I am now, in my own work I made mixtures of precipitate of silver with oxyphosphate, the silver being in very much the same form, and I have seen excellent results from that, although I am inclined to believe there is something peculiar in the behavior of tin in connection with cement, especially when adopting the plan of making a filling and covering it with gold, owing to the peculiar gold-tin action. Dr. Shumway of Massachusetts told me at one time he had secured remarkable results when placing a thin veneer of cement over a tin filling, often filling the cavities of an incisor or canine nearly full of tin, and then placing a thin veneer of cement on it. He said the cement would last very much longer on a surface of tin than as a plain cement filling, and I have experimented at different times with some of this particular precipitated tin to further carry out his work in that line. I have found with an admixture of metals some very satisfactory results. The advantage comes from various sources, as I look at it. I often attempt to increase the strength and resisting power by the incorporation of various non-metallic materials, and at times it is an utter failure from the nature of the materials used, just as in the use of metals the filings or turnings will not give the result that the precipitated crystal will give. In the incorporation of foreign bodies a great deal depends upon the nature of the foreign substance.

The sponge tin I do not care to discuss; some others will be better able to speak of that than I.

In this connection, although it is foreign to the subject to an extent, I wish to speak of what can be accomplished by the admixture of materials other than the precipitated metals. Those metallic mixtures do not have a satisfactory color for the anterior teeth, so while we can use them in the posterior teeth, for the anterior we must look for something else. Here again the nature of the crystal or quality of material comes into play. I have secured a great deal of satisfaction for a few years past, especially quite recently, from the admixture of such materials as properly precipitated alumina or porcelain powders for inlay and other work. From the fact that we can obtain porcelain powders in various colors, we have in that the material which we can use to the greatest advantage for these processes, and I have found after over four years' observation of fillings in which a large amount of pulverized porcelain was incorporated with zinc oxyphosphate, that results have been brought

about which were out of proportion to what might have been expected with plain oxyphosphate. I will say that it has been my experience with cement that on the occlusal surface of a molar or bicuspid it will last several times as long as upon an approximal surface of an incisor. In those cavities the destruction of the filling is brought about from the stagnation of fluids and the fermentation and putrefaction of food, but where such fillings of porcelain and oxyphosphate were put in more than four years ago, the results have been very satisfactory. I find I have made fillings which today are practically perfect, which, had they been made of plain oxyphosphate, would have needed renewal some time since. The theory, as near as I can advance it, is that the porcelain particles—after we have used about equal bulks of porcelain body and cement powder—are so near together as to make something like a very fine inlay joint, and the cement does not seem to waste to the depth of one layer of porcelain particles, so that in a short time we have a surface which is apparently all porcelain, and resembling an underbaked porcelain inlay. I myself have been deceived, having forgotten making certain fillings, and when some of these cases came back I would go to my book to see what I had done, finding that I had made one of these fillings I have mentioned. If it is as I say, that the porcelain particles are so close together as to form a very fine joint, we have a very valuable method in certain cases where we have thin walls which can be retained in that way. I have applied it in just such cases where gold had failed, and on the removal of fillings after secondary caries, I had such a condition that the walls were transparent, and operating in the way I have mentioned I have seen extremely satisfactory results in every way.

Dr. R. C. Turner, Caldwell, Kans. I have been interested in the essay, and I have also been interested in the statement made by Dr. Ames. I would like to ask the doctor a question in regard to the incorporation of porcelain in the cement. I would like to know in what proportion he incorporates it to bring about the effect he has described.

Dr. Ames. I hope what I have said will not switch the discussion from the doctor's paper. There is a great deal of value in that, and one point is the therapeutic action that might come from the presence of the tin, so I hope this will not break into the discussion of the paper.

I do not claim that I have worked this out as to proportions. I put just as much porcelain in as I think is needed, so that it will be properly held together. I attempt to incorporate about an equal bulk of porcelain with cement powder. I do that by placing on the slab with the liquid, portions of the porcelain and cement powder. I mix the cement and porcelain, alternating in about equal proportions until I have made a stiff mix, as stiff as I can possibly make it. Make it just as stiff as you can with the spatula. Get in as much as you can of equal portions of cement and porcelain.

Dr. W. L. Fickes, Pittsburg, Pa. My experience is that any mixture of a foreign body with cement weakens it, and in mixing porcelain with cement I do not see why there should be any difference. Of course, they are closely allied chemically, and experiments have been carried on in the past to quite an extent and abandoned, but now it seems we are going back to the old experiments, and I would like to know why a mixture of cement with porcelain would be any different. I have made a mixture of cement with tin, and I find it weakens it, and I have come to the conclusion that cement is better without having anything mixed with it.

Dr. H. L. Ambler, Cleveland, O. Strictly speaking it is not a tin-cement. That is misleading, but after the paper was read I knew what the gentleman meant. I will call your attention to a few historical facts.

In 1825 Ash of London made an extensive series of experiments in trying to produce crystals, or granules, or fibers of gold, and some of his product was put on the market to be sold as a filling material. But it was soon abandoned. In 1850, S. A. Main of Buffalo, N. Y., having probably read of these experiments,

thought he could make something better and began to make experiments. The result did not meet with success, either commercially or in the hands of dentists. Two years after that A. J. Watts of Utica, N. Y., who was not a dentist, but a photographer, discovered the method of making Watts' crystal or sponge gold, which was put on the market, and with some changes is in use at the present time. As a commercial product it has been just moderately successful, and as a product for filling teeth it has been just reasonably successful. Since that time several other gentlemen up to the present year have tried to make precipitates, and crystals, and fibrous and sponge golds of different kinds, which have not been any great success commercially or in the hands of dentists.

Now if all these different products of gold that have been spoken of had been the best of anything that could possibly be made to fill teeth, why was it that from 1825 to 1904 the best operators in the world, both at home and abroad, did not abandon gold foil and use these different products I have spoken of? Why did not Atkinson, or Webb, or Varney, and other men, throw away gold foil and take up these products? The method of producing the precipitate of tin, crystals of tin, has been known almost ever since tin was discovered. Pure tin may be precipitated in quadratic crystals by a slight galvanic current excited by immersing a plate of tin or clean strip of zinc in a strong solution of stannous chlorid; water is carefully poured in so as not to disturb the layer of tin solution; the pure metal will be deposited on the plate of tin at the point of junction of the water and metallic solution. Scrape off with a clean spatula, wash them clean, dry them, and you have crystals of tin. This is the old story over again, but I want to tell you that although this kind of product is put on the market as a filling material, it has very little integrity. These crystals I have just spoken of can be placed on the hand and with a spatula can be flattened down or rubbed nearly out of existence. Tin was put on the market in the shape of shreds by Dr. Slayton of Ohio. He made a machine for shredding tin, taking a solid bar of tin and shredding it up into a hairlike form, and then it was pressed into small mats and sold. Another form of tin is made by a similar machine which tears it up into shreds and fibers. I am bringing the history of these forms of tin right to the same date I brought the history of similar forms of gold. All these products of tin, such as crystals, shreds, precipitates, and fibers, stand in the same relation to tin foil as similar preparations of gold stand in relation to gold foil. If those preparations of tin were better than tin foil, why was not foil abandoned and those preparations taken up?

In 1859 Dr. Taft published in the *Dental Register* the methods of producing crystal tin for filling purposes, and dentists tried it for a short time, but discarded it as worthless. An electric current may be used to produce tin crystals, but they are no better than the above. There is no question that the mixing of some kind of metal filings with cement will add as a general rule to the life of fillings on an occlusal surface. Dr. Ames said he placed his mixture of the porcelain body with the oxyphosphate powder in the front teeth, and the mixture of cement with the precipitate of tin, equal parts, in the posterior teeth. I believe when you do make a mix in this way, that tin is the best metal to incorporate. I do not use powdered tin that you put on your hand and rub out of existence. I do not want the powder as fine as that, but ordinarily fine. I believe in the majority of cases the addition of the metal adds to the wearing service, and I believe as Dr. Ames does, that when a filling is worn down so that it almost presents a metallic surface, it wears longer than if made entirely of cement.

We know that cement is a poor conductor of thermal changes and electricity, and we know tin to be a poor conductor. Gold is four times as good a conductor of heat and six times as good a conductor of electricity as is tin, so with cement in a cavity where the pulp is almost exposed we still have a good non-conductor by

combining it with tin. Now, if we can incorporate these two substances and make a filling for those difficult cases where the pulp is nearly exposed, I can see where it would be of great assistance to the dentist.

Dr. Geo. E. Hunt, Indianapolis, Ind. I want to say a word in regard to the admixture of amalgam and cement. If alloy is mixed with an insufficient quantity of mercury to make a homogeneous amalgam, and trituration is continued long enough, the whole mass will become a fine, dry powder. Equal quantities of this powder mixed with zinc oxid and made into a mass with the cement fluid in the usual manner make a hard and resistant material. The color is rather dark, but the filling will stand the wear of mastication, and does not seem to be affected by the fluids of the mouth nearly as much as when the amalgam powder is not incorporated.

The essayist not being present to close the discussion, the subject was on motion passed.

A paper written in French on the subject of "Preparation of Cavities," by Dr. J. D. Losada, Madrid, Spain, was read by title.

The Chairman. This concludes the work of this section. Before entertaining a motion to adjourn I want to express my thanks to the committee on Operative Dentistry for the splendid support they have given me in the preparation of the program.

I also wish to express my appreciation and my thanks to the secretary, Dr. Hunt, and also to Dr. Heckard, who acted as secretary *pro tempore* in Dr. Hunt's absence.

I wish to thank the stenographer, Mr. Long, for the assistance he has given us. He has been very faithful in his attendance on the sessions, and I appreciate it.

I also want to thank the members for their uniformly close attention and for their regular attendance at the sessions.

The chairman, Dr. Johnson, then declared the section adjourned *sine die*.

(To be continued.)

NEW YORK ODONTOLOGICAL SOCIETY.

Monthly Meeting, February 1905.

A regular meeting of the New York Odontological Society was held on Tuesday evening, February 21, 1905, at the Academy of Medicine, 17 West Forty-third street, New York city. The president, Dr. John I. Hart, occupied the chair and called the meeting to order.

The paper of the evening was then read by Dr. Joseph Head of Philadelphia, his subject being, tests on the strength, thickness, solubility, and best methods of using the cements that surround porcelain inlays. The paper is entitled "Tests on the Inlay Cement Problem." [This paper is printed in full at page 779 of the present issue of the Cosmos.]

Discussion.

The President. It has been maintained for a very long time that the cement question was the milk in the cocoanut so far as porcelain inlays are concerned. Dr. Head has gone a long way toward solving this question, which is so potent with interest that I am sure all will want to discuss it. I will call on Dr. Gillett.

Dr. Gillett. The general line of thought is interesting and important, and the way the work has been done is even more so. One of the difficulties in reaching conclusions in many of our disputed questions is that we depend too much on clinical evidence, which is abso-

lutely untrustworthy, consequently when we are confronted with the results of scientific work on these points we meet surprises. So far as any attempt at criticism of the statements is concerned, it would be absolutely impossible. When a scientific experiment is made and the result shown to us, it is necessary to first study the methods pursued and the results; then if we have anything to say we must present equally satisfactory results. It is folly to criticize such a paper as this unless the criticism is based on careful experiment. Discovery of flaws in the methods employed or erroneous conclusions are necessary to justify criticism.

I understood Dr. Head to say he considered fifteen minutes as the time necessary for complete setting. In my own cases I have been in the habit when putting in an inlay, where the conditions would permit of it, to take a couple of turns of strong floss silk around the tooth and inlay, tying it tightly, and I have sometimes attempted what seems theoretically a good idea, namely, to put under the floss silk a little bit of rubber so there might be an elastic shove or pressure. I have often found it possible to put that sort of ligature on so that the patient can remove it, leaving one end long and the other short, and telling the patient to draw off the long end carefully.

This has seemed to me a more satisfactory method of maintaining pressure on an inlay than putting in a wedge. To my mind there are two objections to the wedge as compared with the silk ligature: First, you are wedging between two yielding bodies, and instead of the pressure being maintained it gradually grows less, and for the first few minutes it grows rapidly less. The second objection was suggested by Dr. Nyman last month—that it is difficult to so place the wedge as not to strain the inlay a little out of its position; that most of those inlays which we want to wedge are in such a position that the natural tendency would be to shove it from the front; and yet the exact opposite should be the case, because very likely the inlay has been put in from underneath. I have asked my patients to retain those silk ligatures in place two hours if convenient; but if found inconvenient they might slip them off after an hour.

Dr. HEAD. How much pressure do you get there?

Dr. GILLETT. That requires investigation.

Dr. HEAD. I do not believe it is anything like eight pounds.

Dr. GILLETT. I have my doubts. The question arises whether the *maintenance* of heavy pressure is necessary, or whether the pressing of the inlay home and then maintaining just enough pressure to keep it there is the important thing. I think we have all seen a tendency for the inlay to spring back the moment we release the pressure.

Dr. HEAD. Caused by air in cavity.

Dr. GILLETT. Probably something else also. After all, it is what the boys call "pumping hot air" to make statements of this kind in discussing a scientific paper. I can only compliment Dr. Head on the results he has shown, and I wish him "more power to his arm" to continue.

Dr. S. G. PERRY, New York. It is impossible to discuss the statement of a scientific fact—it is a waste of time; and this paper is certainly concerned with the statement of scientific facts. All that can be said is to praise it, particularly the spirit in which the work is done. The grinding of the powder, making it much finer than heretofore, will appeal to anyone's common sense. The ordinary powder might be so coarse that the inlay would not hold. I hope the time will come when the Harvard cement will be made so we can all have the finer grade. In using the ordinary Harvard cement, I have sometimes encountered lumps in it which would not appear at the first mixing.

Dr. HEAD. I brought a little of the powder to show you—the one I use. There is the inlay powder. Try the fine on your teeth first, and then the other, and you will see the difference.

Dr. PERRY. I should think that test

would be a very effective one—trying it in the mouth.

Dr. Head. That test is used in chemistry very often. The powder I make myself I grind in an agate mortar until it gets creamy all over the mortar. I get the Harvard powder because the Harvard cement is so slow-setting that it will stand pulverization without being made to set too quickly. Most of them set so quickly that they crystallize when so treated.

Dr. C. L. Van Vleck, Hudson, N. Y. Do you put water in?

Dr. Head. Oh, no; just grind the powder.

Dr. Perry. The points that have been dwelt upon as important, although they are not all new, are: First, using the finer grade of powder; second, the pressure steadily applied until the cement has set; and third, etching the inner surface. This latter is not, of course, new; but I am glad to hear Dr. Head lay stress on the need of it.

Another point I am gratified with is the advantage of making undercuts when they can be made. I have not been in sympathy with persons who have claimed there was no need for it. I cannot see any harm in it, and I have always felt there must be more safety in making them that way. We grope in the dark when beginning in a new direction, and fumble and do the best we can. We try again and again, each time a little more accurately and scientifically, and perhaps after many years of effort by one and another we finally adopt a method which we ought to have adopted in the beginning—that is, going about our work very accurately, just as a chemist would in his laboratory, step by step.

We dentists are hard-worked men, not always having the time, or strength, or the encouragement to do these things as we should. In this country there is not the scientific atmosphere or the environment to go about things as we should in such matters.

Dr. Head has done for us a great deal in the past, and he will do more in the future, particularly in this direction. I wish we might have had time to have the question of colors of cements and inlays touched upon, and I hope before we part Dr. Head will say something about that. Although it may not be germane to the actual subject of the evening, it is very near it. It is an open question as to what is the best way to get at the final and best result—whether to pay very close attention to the matching of the inlay material, or whether that can be done half carelessly, you might say, and supplement it by the proper selection of the proper color underneath. I suppose we have all placed inlays that were nearly right but not quite, and taken them out quickly, cleaned them, substituted another color underneath, and obtained perfect results. A great deal of it is guesswork, and in the haste and hurry of this dreadful age, when many of us charge by the hour and feel we must not waste a minute (which is a cruel method, and yet perhaps is the best after all) it is too bad that we will not do that work and keep on doing it until we have the inlay just as we wish it. But I cannot do it; I have to let inlays go sometimes that I am ashamed of, and pray for something better next time. They save the teeth even if not so well done, and that, after all, is what we are paid for and what we should strive for.

The President. The chair would like to ask Dr. Northrup how these experiments measure up with his experience. We know Dr. Northrup has been working with porcelain for a long time.

Dr. A. L. Northrup, New York. In the course of my life I have often been very much disappointed with expected results, and very much pleased with others. The paper of the evening has solved some doubts I have had, and I have been very much pleased with it and can make no criticism. All I can say is, God-speed the essayist in the work he has undertaken, and I hope he will give us the benefit of his experiments in the future, so we may attain better results.

I have not had as good results with porcelain inlay work as many claim they have had. I have heard many say they can always match the teeth, and that they make the lines so perfect you would have

to take a magnifying glass to see whether it was porcelain or tooth. I have not reached that stage yet. I have seen some inlays that nearly approached it and many others that did not come anywhere near it; but I think with perseverance we may reach human possibilities. It is a great step forward in the artistic side of dentistry. We will get rid of that horrid sight of gold. I would rather have the gold in my pocket than to have it show in my teeth. I think porcelain work has come to stay with us, and it is a great help both to the patient and the operator. Porcelain inlay work is an operation that commends itself where a tooth is very sensitive—one you might have a great deal of trouble filling with gold on account of the thermal change. With a porcelain inlay properly put in you avoid all these difficulties and give the patient a great deal of comfort, likewise satisfaction to yourself.

Dr. Van Vleck. I have been doing considerable porcelain work, and have never etched any fillings at all. I have done all my fillings by cutting them with the diamond disk, and I have had reasonably good success in keeping them in. A few have come out, of course, but not many. In approximal cavities I always wedge, if I can. I do not think, as Dr. Gillett said, that there is any danger of wedging them out of place if they fit. If they fit they cannot go anywhere else except in their place. I am doing more of it every day, and I think it is going to be *the* method of preserving teeth.

Dr. W. D. Tracy, New York. I think most of the interesting points of the paper have been mentioned. One thought that came to my mind during the discussion was that in my early experience in porcelain some of my conservative friends told me if I did not have my patients sit outside in the reception room with the rubber dam on for sixty minutes or more after the operation the inlays would not stay in. My office arrangements did not permit of my having the patients remain there for that length of time, and I wondered why my inlays stayed in. I think it must have been because I etched them. Six or seven years ago, Dr. Perry brought out the white rubber disks for use in grooving inlays, and they served an admirable purpose. If one will take the trouble to look at a piece of porcelain under a strong glass after it is etched with hydrofluoric acid he will readily see that etching is more advantageous than grinding. There are some who advocate having the cavity more or less saucer-shaped, but that method of cavity preparation seems to be giving way to the more definite cavity formation providing a seat for the inlay.

The paper must have entailed an enormous amount of labor, and I think we should give Dr. Head a hearty vote of thanks. The results of his work have certainly justified the effort.

The President. Those who attended the Second District Society's meeting all know how enthusiastic Dr. Jarvie is on this subject. I purposely refrained from calling on him earlier, but we would like to hear from him now.

Dr. Wm. Jarvie, New York. The results of Dr. Head's experiments determine positively some things that we have perhaps believed but did not absolutely know—that finely ground cement was better for the securing of inlays than a coarser powder; that etching was almost necessary to assist in the retention of the filling, and that inlays should be undercut as well as the cavities. We know that zinc oxyphosphate placed in a cavity that is not undercut at all will stick to the dentin; but if the cavity is undercut the oxyphosphate will not only have that same adhesive property, but have the advantage of being mechanically retained in addition, making assurance doubly sure.

I was very much pleased indeed to learn the amount of pressure that was necessary to remove a well-inserted inlay. My recollection of the statement is that an average of 25 pounds was required. It would be impossible to get one-hundredth part of that pressure upon any inlay placed upon an approximal or labial surface. On a labial inlay there is no force exerted except perhaps that caused by some sticky substance adhering to it. Such force is trifling compared

with the 25 pounds of pressure exerted by the plunger, which was necessary to dislodge the inlay.

Dr. Head. That was with deep undercuts.

Dr. Jarvie. Well, I am supposing inlays which have been undercut and etched. Indeed, I think it a mistake not to do three things—etch the inlay, undercut the inlay, and undercut the cavity. I have not put in as many inlays as some of the gentlemen in the room, but I have never had any come out, which has been my good fortune rather than superior manipulation. In view of the light of these experiments given tonight, I cannot understand a statement made by Dr. Head before the Second District Society a month ago, in which he said he frequently had to replace inlays. It would seem as though the only inlays upon which any out-driving force at all could be exerted would be those on certain angles or corners—largely those on the incisor teeth, because an inlay in any of the angles on the bicuspid or molar teeth would not get any out-driving force at all. And to displace inlays even so situated would require a force under which the adjacent walls would break. The results of Dr. Head's experiments would indicate that defective manipulation rather than imperfect material was responsible for inlays coming out. The experiments should encourage us to look for the permanence of porcelain inlay work.

One point not alluded to, which is probably known to all of you, although I am ignorant of it, is the proper consistence of the cement—that consistence by which we get the greatest strength and yet sufficient plasticity to allow the inlay to be pressed home to place. Is there a formula—a certain amount of phosphoric acid to a certain amount of zinc oxid—by which this result can be obtained?

The President. When Dr. Head answers Dr. Jarvie's question, I would like to ask whether the atmosphere and the temperature changes modify the consistence of the mix.

Dr. W. J. Turner, Brooklyn, N. Y. I wish Dr. Head in closing the discussion would say something about the amount of spatulation desirable in mixing cements. I have always thought that the more thoroughly the cement was spatulated the more enduring the result would be.

Dr. W. B. Dunning, New York. This may be a little beside the mark, but Dr. Perry spoke of the color of cement. It seems a simple matter to put a drop of water into the cavity and test the different colors before mixing them. I frequently do that with a piece of porcelain that is not the right shade, having all the colors of cement supplied by the Harvard people.

Dr. L. C. LeRoy, New York. I would like to ask something as to the question brought out about the air in the cavity. After the cement is placed in the cavity and on the inlay, and both brought together in the proper way, are we to understand that air is still present? Has not all air been spatulated from the mass, and is there not an elastic medium, which on pressure asserts its elasticity?

We all use different methods of holding inlays in place while cement is in the process of hardening. One of mine has been to place a piece of sheet celluloid, such as Kodak film, over the inlay in position after removing surplus cement and tying with silk floss. It prevents the edges of the porcelain from projecting beyond the edges of the cavity. I get so much better results with it that I use it where it can be adapted. Often a broad elastic band brought between the teeth and allowed to exert its pressure there, as a wedge, is of considerable value. The placing of an ordinary wooden wedge is contraindicated in many cases because of the application of pressure in a direction that is not required. It is my experience that it forces the inlay out at some point.

Let me further say about celluloid: its transparence is a helping factor. The coating of photographer's silver salt need not be removed for this purpose. Simply see that the glazed surface is in contact with the tooth.

Dr. Perry. I have never tried the

method of Dr. Dunning, of using the powder with water. I think the color might be determined, but there would be an objection to the method. It seems to me it is desirable to put the inlay in when the cavity is perfectly dry, coming as it does fresh from the furnace. I try to avoid putting the inlay in a wet cavity.

One word in reference to the cutting of the grooves. It is true that there is danger in undertaking to cut grooves around the edge of very thin inlays unless the engine is run very carefully and the hand held very steadily. I think I have been using this winter the etching more than ever before, probably because of that experience in injuring the edges and partly from the fact that I am nearly out of those little wheels of white vulcanized rubber that were made for me. I have felt I could cut a narrower groove with them than any diamond disk I ever saw, or any wheel I ever saw.

Dr. Dunning. If that color test were made before the etching, I do not think the inlay would be injured by the fact of the water having been used.

Dr. Gillett. When I sat down, Dr. Merritt said something to me which I think should be repeated. He suggested using gilling twine or grass line, which many of you no doubt use for wedging and you know its shrinking qualities. Japanese grass line is obtainable at many of the sporting goods stores. I should think the smaller sizes might be effective for maintaining that pressure where it could be tied around the tooth.

Dr. Perry. On the subject of wedges, I have often wrapped the very fine silk I have around the inlay and the tooth, tied it tightly with a double knot and forced the wedges underneath that ligature. I have a few times placed the wedge directly over the inlay, and once or twice have wet the wooden wedge so it would swell and bring greater pressure directly over the inlay.

Dr. Hatch. I would like to ask Dr. Head if when he adapts the newly mixed cement to the old he keeps it dry, or whether he moistens the old cement. It has been my custom to moisten the old cement with the cement liquid, but I have not known whether it was the best thing to do or not.

Dr. Head. The first question I shall answer is a combination of that asked by our president and by Dr. Gillett, who spoke about maintaining pressure on these inlays on labial surfaces, high up on the gum. It would be rather difficult to get a grass line or any other kind of line around them unless you bored through the gum.

Dr. Gillett. Does not that illustration (on blackboard) answer the question.

Dr. Head. I do not think it does. I would rather hold it for fifteen minutes.

As to the question Dr. Gillett asked me, about the length of time I consider necessary for the setting of cement. When the cement becomes brittle, I have taken for granted that the practical value of maintained pressure was done away with. Since with only this one-minute pressure there is only an increase under the most favorable circumstances of 25 per cent., I can hardly think that when that one minute is increased by fourteen more there is much to be gained by a continuance of the pressure.

The way in which I manage labial fillings of this character is to make them sufficiently deep to permit the pressure of cement crystallization to be exerted on them. I have never been quite convinced by these flat adhesive tests. It is unquestionably true that on flat surfaces the cements give these adhesive pressures noted; but we must remember that if the ordinary filling is of sufficient depth to allow the cement when it expands to pinch that filling, we obtain by this means a great deal more pressure than can be applied by any apparatus that can be devised. When the Harvard cement sets wet it will expand from one to two per cent. It will contract when it is dry; therefore it has been my experience that if I can get my cavities so that there is an undercut, and put inlays into position in a dry state with a good body of cement around the filling, the results will be very satisfactory. Where I have failed—I do fail in spite of Dr. Jarvie's kind remarks—the failure has been owing to the

sensitiveness of the tooth and the shallowness of the cavity that prevented the utilization of the pressure of crystallization. In the filling tests where pressure was maintained for one minute only, 25 pounds adhesion was obtained.

Dr. JARVIE. What class was that generally where they came out?

Dr. HEAD. Mostly where there have been tremendous bites that have broken off a side of the tooth. That, of course, will happen to any of us. This class is noticeable with old men who have lost their back teeth and will not have back teeth put in—where they have this edge-to-edge occlusion.

Anybody knows that natural, perfectly strong teeth can be chipped and broken in two by a blow. Therefore who can get up and say that he puts fillings in the mouth of men with strong bites, and that those bits of porcelain cannot be knocked out?

Dr. JARVIE. In that case, they would break through their fillings, too.

Dr. HEAD. I have actually had these old men chew off inlays built up with solder.

Dr. JARVIE. Would you risk porcelain in such cases?

Dr. HEAD. Oh, yes; I would risk it. It sometimes stands.

As to the consistence of the cement, I follow out the lines of men who have worked in cements, and I have worked it to a creamy consistence. Dr. Ames found if a little more powder or a little more of the fluid were added it had comparatively little effect on the solubility. As in warm weather we are apt to have a greater amount of moisture in the fluid on account of its deliquescence, it would be difficult to weigh proportions of phosphoric acid and powder unless one got a hydrometer and weighed the specific gravity of the fluids. I made these with a creamy mix. I had some interesting experiments in the Ames cement, where there were three or four mixes that set so quick I thought they were poor, and I measured them and found that one did give an increase over the average of three-ten-thousandths of an inch, while the other varied even less. I thought the variation would be the same in the others if we got the cement in a fairly creamy condition.

The spatulation with a coarse cement is much more necessary than with a fine cement. The reason they talk so much about spatulation is because they want you to grind these coarse particles, but I think it is better that the grinding be done by the manufacturer than by us. The moment I feel any grit, I discard that cement.

Color was spoken of by Dr. Perry. That is a large subject. I cannot feel that we should give up matching the teeth. Of course, where you have approximal cavities we know the color must be made lighter. If one were to make a "snap" statement, I would say that if we were going to put in approximal fillings I would take the number that matches No. 36 white and 41 white. Four times out of five with yellowish-white Harvard cement they will have a sufficiently light color to reflect the color from the opposing tooth and make a good match. They will counteract the shadow of the cement. I have also found the chief difficulty of getting the color of an inlay lies in the fact that we want to make it too pretty. We bake it until it is more like glass than porcelain. We try it in and, seeing the tooth through it, say it is fine. Then, we cement it in and see the cement color, and we are not satisfied at all. The chief thing is not to overbake the porcelain filling. The most difficult fillings to really match are the labial cavities. If we really match the porcelain in a labial cavity, and do not overbake it, then taking the Harvard yellowish-white cement and adding a little brown or blue of the Ames' pigment until it is a little lighter than the tooth, and cement the filling into place, we shall obtain a good match in an astonishing number of instances. The cement being lighter than the tooth will counteract the slight shadow of cement that is cast. It is my belief that in every porcelain filling put in there is a slight darkening. The reason that the yellowish-white Harvard cement is so popular is because it is the natural color

of the dentin of the tooth, and being light it counteracts the slight darkening that occurs when the inlay is cemented into position.

The question of air I think has nothing to do with spatulation of cement. We get a bubble of air in the cavity, and every time we squeeze it it obeys the law of pressure, and every time you release it it expands and presses out the inlay. We have heard of crowns being so pressed to place and then rising as though a spirit were beneath them.

In the question of making the pressure, I have to take off my hat to my dear friend Dr. Perry. When I have any difficulty I put a Perry separator on and make the separation I need. I cement my inlay into position, then put the wedges, release the separators and they come gently into place.

As to the holding in of the labial inlays where I think I cannot get this squeeze—this pressure from the expansion—I hold the filling until it sets for a minute or two. Some say that heat interferes with the strength of the cement, but such is not my experience. I take a warm instrument and hold it there until it sets the cement rapidly. It has not been my experience that those fillings would come out any more rapidly than any others. Still I do not know positively.

The PRESIDENT. I mean whether you maintain the pressure with your finger or an instrument, or how.

Dr. HEAD. I maintain it here for about a minute. We must remember that these fillings that stood an average of 25 pounds pressure were only retained a minute.

Dr. LEROY. Did you experiment with the hardening of cement?

Dr. HEAD. I have not done that. That is something that is worth while working out. There are a hundred and one points that could have been done, but I wanted to bring out general principles that would make the manufacturers at large know what they were talking about when they claim certain advantages for their cements.

Dr. PERRY. You use the Harvard cement exclusively now?

Dr. HEAD. I use the Harvard pulverized absolutely for inlays. For crowns I use the Harvard inlay.

Dr. TRACY. I move a hearty vote of thanks to Dr. Head for this instructive and interesting paper.

Motion carried unanimously.

A MEMBER. May we not ask Dr. Head if, after the continuation of his experiments we may have the benefit of them when they are completed?

Dr. HEAD. I shall be very glad to comply—probably some time next fall.

Adjournment.

W. B. DUNNING, D.D.S.,
Editor N. Y. Odont. Soc.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

Special Meeting, December 1904.

A SPECIAL meeting of the First District Dental Society of the State of New York was held on Monday evening, December 12, 1904, at the Academy of Medicine, No. 17 West Forty-third street, New York city, Dr. Henry D. Hatch presiding.

Dr. HATCH. This is a special meeting called for the purpose of hearing Dr. G. V. Black's paper. You all know Dr. Black; you all honor and love him; so it seems to me any time spent by the chairman in introducing or eulogizing Dr. Black would be time wasted. A word, however, in regard to the subject. We feel that this subject of "Extension for Prevention" is one that has been misunderstood—misinterpreted possibly—and has caused dissension in dental circles. Geographical lines have been drawn, so that one practice seems to prevail in the West, and another in the East—the Northwestern University teaching one doctrine, and the University at Buffalo another. At this meeting it is hoped that Dr. Black will so thresh out this subject that it will be settled—if it can be settled.

When Dr. Black rose, he was greeted with the most enthusiastic applause, which continued until he was obliged to raise his hand for silence.

Dr. Black then read his paper on the subject of "Extension for Prevention." It was illustrated by lantern slides. An abstract of the paper here follows:

EXTENSION FOR PREVENTION.

I take great pleasure in coming before the First District Dental Society of New York at its invitation and saying a few words regarding the much discussed subject of extension for prevention. There seems to be no considerable necessity for a review of the literature of this subject. The discussion of it began with my papers of 1891, published in the DENTAL COSMOS, and has grown broader and deeper year by year. This discussion has been a distinct addition to thought in dentistry, and has affected the practice of every progressive dentist, no matter what his attitude toward the propositions discussed.

This literature is the property of the dental profession. Most men have their own individual notions regarding it and of its value. These notions have been variously derived, partly from their reading, from cases in the practice of others that have come under their observation, from what they have noted in the cases presented for treatment in their own offices, and by the thought expressed by those in whose opinions they have great confidence.

These are all legitimate methods of forming opinions upon subjects in dentistry, but it must be remembered that the views of each and every person will be colored and modified by his own preconceived views derived from his earlier education in dentistry, by the plans of operating formerly prevailing in his own office, by his intimate friends and persons he has known and honored. None of us form our opinions purely from individual study and elaboration of the clinical facts we have ourselves observed. On the whole, it is well that we do not. It is the nature of the human mind that one shall lean upon another and that harmony of thought shall, for the most part, prevail. Yet it is well if there be reasonable dissensions and discussions with sharp criticisms which lead to better understandings of the subjects of contention.

Human thought as represented in the progress of any professional or scientific

work, is much like the waters of a great river. Through much of its course it flows on smoothly in one unbroken current, receiving tributaries at frequent intervals which increase its volume. But occasionally a rocky defile is reached and boulders and rocky islands fret and divide the waters, and there is parting of ways and jostling to and fro among the boulders and much foaming and turbulence as the waters rush hither and yon. But when the rocks and the islands are passed all of the divided waters again unite in a steady, smooth-flowing current, improved in purity, increased in volume by tributaries, and it peacefully sweeps on. The rocky defiles that for a time fret the waters but add to the glory of the river. So may it ever be in dentistry. If we surge upon and jostle each other when we come among boulders of thought, we will unite again beyond, all the better for the contention.

The literature of extension for prevention is the property of the dental profession, and what I might say of it now would be of little value. I shall be glad, however, to give you my thought regarding the practice and explain the plans and the reasons for them more perfectly perhaps than I have been able to do before, through the selection of photographs and drawings which I am now able to present. In doing this I ask that all of you, so far as you are able, lay aside for the moment any and all ideas you may have formed of this subject and follow my thought through, and afterward determine whether or not it will fit closely with your personal observation.

I may say that extension for prevention was not entirely new in practice when I first wrote that expression of it. A number of men were in some degree practicing the same general thought. In my writing it might be said that I only crystallized the thought into more definite form of expression and brought it more intimately to the minds of men. The controversies occurring since have served to distinguish it as a somewhat special form of practice, having for its object a more radical and definite cure of decay of the teeth. Its practice calls for a closer study of dental caries in both the pathological conditions surrounding and promoting the evil and the initiation and steps of progress of the physical damage done to the teeth. It should not be simply a study of dental caries as a question in pathology, but also a mouth-to-mouth study of the cases presented and the tendencies to increased violence or progressive abatement in each, of all the light to be obtained from the hereditary tendencies in the individual's family, the present and prospective conditions of the individual, coupled with a close and accurate study of the injuries done and the tendencies for the future toward increased susceptibility or toward immunity in the individual case. It is not, and the practice of dentistry should not be, simply the removal of decayed areas and repairing them by filling the cavities tooth by tooth, each independent of another. In this sense operative dentistry would be simply a mechanical process, little better than a trade. A truly professional practice requires something more. The treatment of each physical injury by dental caries should be designed from a standpoint derived from a careful study of the person, the tendencies of caries in the mouth as a whole, and finally from the conditions presented in the individual tooth. This operation should be planned and executed in its relation to the whole and for the benefit of the whole mouth and person. The filling of a cavity in an incisor tooth is only one incident in the general scheme of treatment for that person.

When such studies of cases have been well made and the observations have become extended to large numbers of persons, it should become apparent to the observer that there are, with our present methods of treatment, two principal dangers to be met. The greatest immediate danger in any case of dental caries lies in its disposition to penetrate toward the dental pulp and involve that organ in disease. The greatest ultimate danger consists in the disposition of caries to spread widely in the surface of the enamel and form new areas of penetration. Re-

moval of present decay to sound tissue and the correct filling of the cavity controls the present penetration. Extension for prevention calls for the cure of greatest ultimate danger by determining its areas and including them in the initial operation.

Caries of the teeth always begins on the surface of the enamel and extends inward. When this beginning is strictly localized within a given small area of surface, as it is in its beginnings in the pits of the occlusal surfaces of the molars, its treatment should give little trouble if undertaken before the penetration has become so great as to seriously affect the health of the pulp or the strength of the hard structures. In these cases observation has shown that in case the fillings are well made, so as to prevent the recurrence of decay between the filling and the cavity wall, there is no disposition to a spreading of decay in the surface of the adjoining enamel. Therefore, practically we are only required to effectually stop the original penetration. In these occlusal decays the opportunity for the beginning of decay is in the depths of the pits or fissured grooves, because of the lodgment of a certain definite kind of uncleanness which gives rise to localized acid fermentation. Whatever may be the tendency of the decay thus started to penetrate into the dentin, its spread upon the enamel is effectually hindered by the uses made of the occlusal surfaces of the teeth.

When we turn our attention from the occlusal decays to those that begin on the smooth surfaces of the teeth, the approximal and the labial or buccal, we find a total change of conditions, and kind of progress of caries as effecting a beginning in the enamel, in that there is a definite and persistent tendency to spread on the surface involved. It is true that the very first beginnings of decay in these positions are often localized in very small spots, but more frequently we see the tendency to spread on the surface, and that the penetration of the enamel is in the form of a very obtuse cone with the larger area on the surface. This brings the first penetration of the enamel to a small point in the center of the area; or in areas of very irregular form, which are not uncommon, there may be several points of penetration in near proximity. These areas of injury to the enamel show, when the surfaces are cleaned and dried, as whitened areas over which the enamel has lost its luster and translucency. In many cases in which caries has penetrated through a small, whitened spot there is later, after its enlargement, no whitened area to be seen about the cavity opening. This must not be taken as evidence conclusive that there is no tendency to spread upon the surface beyond the original spot. When the dentin has been reached the decay often spreads rapidly along the dento-enamel junction and the destruction of the enamel by decay from within outward is more rapid than the spread upon the surface. This obliterates for the time the appearance of superficial spreading. Yet if we fill this cavity and stop the internal spreading and the backward decay of enamel, we will often find later that the tendency to spread on the surface has again shown itself and decay has attacked superficially outside the area of the filling and thus outflanked the operator.

In a still closer study of this subject, we find that the beginnings of decay in the enamel and its spread in the approximal, buccal, and labial surfaces is limited by well-defined lines. These limiting lines are the angles of the teeth, stretching from occlusal to gingival, or on the buccal and labial slightly around the actual line of the angle toward the approximal. The highest degree of immunity is usually well within the outer portion of the embrasures. This immunity may be increased and extended by certain devices in operating. One of the most important of these is the narrowing of the original contact, or by separating and building out a more prominent contact point. This will increase the run of foodstuff through the embrasure in chewing, and assist in maintaining cleanliness. In the preparation of all cases of proximal cavities the cutting should be sufficient to lay the margin of the cavity sufficiently out into the embrasure to free its mar-

gins well from near contact with the approximating tooth.

My observation has long ago shown me that these angles were lines of comparative immunity to decay by reason of their position, but recently I have had the opportunity of examining this on a very large scale in the great clinic under my management. I directed that an account be kept of every case in which a decay starting upon the approximal surface extended beyond this angle of the teeth on to the buccal surface, or where the decay beginning upon the buccal surface extended beyond this line on to the approximal surface, or where the two decays meet in their extension. Remember, however, that this is the extension of decay upon the surface of the enamel, not the extension of decay by burrowing in the dentin and undermining the enamel. In an examination of eight thousand persons we found such decays extending past the angle of the tooth in a little less than one to the thousand persons. These persons were from all ranks of life, but most generally from the great middle class of our people, and represent very well the average tendency of the extension of decay past these angles. I know such statistics as these are often unreliable, and it may be that in this examination there were fewer than normal, and that in another examination of the kind we might find a greater number, but I am inclined to think not. In these examinations, decays beginning upon the angles of the teeth on account of some blemish, or pit, malformation, or malposition of the tooth were not considered. They were regarded as accidents only, which did not represent the tendencies in the case. It was only those cases which show the general tendency to broad spreading, and in some of the teeth actually spreading past the angle, that were counted. This shows well the value of these lines in laying out the margins of cavities. The closer we approach them without cutting past them, the more certain we are to prevent future decay on any given surface. If from any reason, as from the burrowing of decay, it is necessary that we cut past these angles, we are cutting into a region of greater danger to the recurrence of decay, instead of toward a region of greater safety. The rule should, therefore, be that we cut well toward these angles in cases of unusually severe tendency to caries, never overstepping the line. This is the essential feature of extension for prevention and may be used to its full limit in those cases demanding it, yet in the study of cases we find that those cases which require the full extent of extension for prevention are very few indeed, and a less degree of cutting toward the angle is sufficient.

Every operator should make himself well acquainted with the tendencies of decay in his cases and treat each person with broad cuttings or not, as the tendencies to decay demand, remembering always that to succeed in the management of the teeth of those persons who have a strong predisposition to dental caries, depends upon preventing areas of decay beginning upon the surface of the enamel, as well as preventing the burrowing of decay deeply into the dentin.

It may be held, doubtless will be held by some, that with the young people it is often impracticable to carry out these methods of treatment. It may be said that what may be regarded as impracticable by one may not be regarded as impracticable by another operator; but my counsel would be, Do not attempt to make permanent operations unless you can make them perfect operations. For children or the very young, we must keep that particularly in mind. One reason why operations for children have resulted so unfavorably is the fact that they have been so poorly made because of the difficulties encountered. I should study my cases well, and where it was my judgment that I probably could not make perfect operations, I should temporize and wait for better conditions. Furthermore, as I have often said before, we should never break down the nervous system of the child; we should never break down the courage of the child; we should not undertake operations that are too severe for the child to bear, for by so doing we will make an enemy of that child. The

child will grow up with a horror of dentistry, and neglect of the proper treatment of its teeth will be the result—a shame to dentistry. But tide them along and look carefully for a time when thorough, good, and sufficient permanent operations can be made, and when the time comes make them with a firm hand, tempered with moderation and sympathy, but make the operations complete and thorough.

Discussion.

Dr. R. H. Hofheinz, Rochester, N. Y. Dr. Black tells us that there seems but little necessity for a review of the subject of extension for prevention; that most men have their own individual notions regarding it, and none of us form our opinions purely from individual studies, yet that it is well if there be reasonable dissensions and discussions with sharp criticisms, which lead to better understanding.

Many great ideas, gentlemen, did not penetrate into the general human mind with the deserved rapidity, because that idea lacked its enthusiasts and its sharp antagonists. I am not sure whether Dr. Black's extension for prevention studies and writings would have made as rapid an ingress into the practice of every progressive dentist had it not been for the many apparently sharp differences between the men who were in close contact with Dr. Black and were enthused by not his investigations alone, but by his magnetic mind and personality, and the men who viewed the subject away from influences of that kind. This brought about such controversies as are on record.

If others and myself were impressed by the fact that some of Dr. Black's followers were advocating extension for prevention to an immoderate degree, I at least have had plenty of opportunity since to charge that difference of opinion to temperamental conditions more than to anything else.

It was fortunate for Dr. Black's theory of extension for prevention that it has found so many enthusiastic fighters, and if at times they sent their projectiles beyond the lines of defense, they were the ones who kept the enemy awake and carried the cause where it belonged, and these gentlemen deserve a great deal of credit.

If extension for prevention had done nothing more than make us closer students of the dental environments it would have done very much indeed. The conscientious operator will hesitate to extend a strictly lingual cavity in the incisor into one which can be viewed from the labial aspect, without studying all the conditions, and the possible removal of those conditions, which may lead to a recurrence of decay, before he resorts to the extension labially beyond the contact point.

First: Regarding occlusal decays the pictures showed beautifully the great amount of dentinal decay in comparison to enamel decay on other surfaces.

Dr. Black tells us that a certain kind of uncleanness gives rise to localized acid fermentation. I go farther than that and take the opportunity to add that in this class of cavities the bacteria have a more direct action in the cause of decay owing to the ready contact with the dentin proper, where they convert the albumin which is the basic substance of dentin into a soluble mass. I believe that in these occlusal fissure cavities there is less danger of not cutting enough for extension for prevention by the general operator than there is danger of leaving enamel walls sufficiently protected by dentin, owing to the insidious manner of decay as indicated by the drawings.

Regarding the amount of extension upon the occlusal fissures I have adopted Dr. Ottolengui's dictum, that whenever the two enamel surfaces form an acute angle they must be included in the excavation with the decayed part of the fissure. Whenever an obtuse angle is formed the chances for a recurrence of decay are reduced to a minimum, if not entirely to an improbability.

Second: Three most prominent factors were brought out by the paper and the drawings regarding the extension for prevention upon the approximal surfaces.

(1) The broadening of the cavity toward the gingival, labio-gingival, and

linguo-gingival angles, instead of leaving the cavity rounded toward the gingival wall, as frequently done in former years. There has been a good deal of discrepancy regarding the amount of extension in these cavities in relation to the general environments; but there has been no difference of opinion regarding the flat base advocated against the pre-existing rounded one. The amount of extension at these points does not only depend on the prevention of recurrence of decay, but is largely governed by the amount of stress the filling must undergo.

Upon the approximal surfaces of anterior teeth I am not yet convinced that it is best to sacrifice the esthetic appearance to the possible recurrence of decay by broadening all angles. We well know that if the gold is not fully visible, but is kept in the shadow, the filling has the appearance of a dark spot, and in many cases at least a millimeter of gold exhibition is necessary to get the rays of light on the yellow surface of the gold. This question alone in many instances decides in my practice against the extension labio-gingivally. I would rather in these cases take a chance of recurrence of decay than extend for prevention of redecay. Modern prophylaxis employed in cases of that kind should prevent a recurrence of decay under most circumstances.

(2) The fact, and by far the most important fact, that an unnecessary amount of extension can be avoided by wide separation and building out contact points that will hold the margins of the filling well away from the approximating teeth and make good and safe fillings with less breadth of cutting than would otherwise be necessary. Gentlemen, this is a fine distinction and takes away all possible opposition which has existed between some of the so-called eastern and western men in connection with the extension for prevention in fillings of this kind. Let this argument stand as the most conservative one in extension for prevention: That it is not the question of size of filling, but frequently only of proper contact with the adjoining tooth. The great objection to an over-extensive cutting in *all* of these cases is the frequency with which these fillings occur early in life at a time when the maximum amount of gold is most dangerous to the pulp. This method of extension does away with this objection, and it is for this reason, undoubtedly, that small and medium sized cavities have been better filled by some men with porcelain, where it is relatively easier to produce different contact points by increasing the convexity of the filling.

This method of filling serves one other purpose: it prevents the driving of shredded food between the teeth by the opposing teeth; and I have seen many so-called ideal fillings where the contact point was not firm enough in relation to the opposite pressure, which necessitated additional filling.

(3) The other most interesting point Dr. Black made was regarding the whitened area of decay which may have penetrated the enamel in a narrow point, and the decay going on spreading in the dentin, burrowing along the dento-enamel junction much more rapidly from the inside out than the spread of decay externally. It seems to me as if this were somewhat different from ordinary decay. There is no apparent action on the surface, but a sort of osmotic action has taken place. Secretions have passed through this surface into the dentin, thus breaking down dentin and causing decay, or rather a chemico-physical disintegration, from inside outward. I wish to ask Dr. Black whether he classifies this under ordinary decay? I should consider it more of a chemico-mechanical process, like ashes falling in the fire in a heap. I have seen numerous specimens of that nature, where apparently the outside was intact and yet the white spots of disintegration were visible in the dentin. I believe that the fact of the enamel being apparently intact is owing to the constant if slight motion any tooth undergoes in its socket when brought in use by the opposing tooth, thus retaining a highly polished surface by friction; and it is for that reason that it seems to differentiate itself from the ordinary process of decay and appears more like a

chemico-physical process than a chemico-bacterial one. It is well known that such superficial spots are arrested by approaching immunity before penetration has taken place. The spaces in the tissues are filled by foreign materials which get dark brown in color and produce what I believe Dr. Bödecker has termed pigmentation.

Third: The argument Dr. Black uses in regard to the safety angles in buccal cavities every careful observer must accept. What astonishes me greatly in this connection is the remarkably small percentage, 1 in 1000 mouths, which showed the decay passing these angles. I assume that the patients examined in Dr. Black's infirmary were of the same order that we see in all other infirmaries, patients who give their mouths a very low degree of prophylactic care. The question arises how small a percentage of such recurrence of decay would we find in a practice where patients receive proper prophylactic care. The anatomic shape of the tooth enters largely into consideration; the area of decay is always bounded by the point of greatest convexity of the surface, where the food jumps from the surface of the tooth to that of the gum. I believe that many buccal surfaces show white spots without being disintegrated. It is my habit to most thoroughly polish these surfaces before diagnosing the area of decay and determining the amount of extension. In many cases the very smallest amount reveals enamel penetration, all other spots being plaques of some nature which future prophylaxis of these surfaces can easily keep away.

Fourth: The occlusal step in bicuspids and molars to which Dr. Black alluded does not, as the essayist himself said, belong to extension for prevention. This belongs principally to the question of anchorage, and yet I believe that secondarily it may be classified under extension for prevention. The large step permits of a better vision of the entire cavity. No cavity can be well filled with gold that cannot be seen in its entire circumference. The cutting away of the occluso-approximal angle greatly facilitates the thorough inspection of the cavity, and it thus becomes indirectly an extension for prevention.

Fifth: The question of time for an operation in connection with extension for prevention has also been touched upon by Dr. Black. There is no doubt that large accessible cavities are more readily filled than cavities of the same character made inaccessible through their smaller size. The gentlemen who used non-cohesive cylinders for the foundation of such fillings in years gone by, and depended upon the wedging system, would probably miss the buccal and lingual wall which, when extended to safety lines, should nearly all be filled with cohesive gold. The *Transactions of the International Medical Congress* (vol. v, 1887) show that I filled a disto-occlusal compound cavity in a second bicuspid with soft cylinders in combination with cohesive foil with five sheets of No. 4 gold; time required for filling, fifteen minutes. There certainly must have existed considerable extension to get five sheets of No. 4 gold into the cavity in fifteen minutes. If I am to fill a cavity of such size today with buccal and lingual walls extended, I require more time for the operation, because I would use considerably more cohesive gold.

Dr. Black has treated the question of extension for prevention largely from the physical standpoint, and I am grateful for that fact. He has said enough of the truly scientific in former papers to have needed a sort of physical *finale* with such remarkable object lessons as he brought to us through Dr. Noyes' drawings and his own. I cannot refrain, however, from asking Dr. Black what the status of our friend, the microbic plaque, is today in relation to decay. Chemico-bacteriologically speaking, the microbic plaques were some of the most important reasons for extension for prevention. In one of my papers on extension for prevention I alluded to the fact that Dr. W. D. Miller thought that no real evidence of their serious nature had as yet been produced. During the International Congress in St. Louis, when Dr. Miller read his prize essay, which Dr. Black discussed in my section, I heard Dr. Miller make the

statement that he had seen teeth which were decayed on numerous surfaces excepting under the microbic plaques, of which cuts appear in the December number of the Cosmos. Dr. Black doubted the fact, and thus it is left. This is too important a factor to lose sight of, and I beg Dr. Black to speak of this question in particular, when he closes the discussion.

Now, gentlemen, what have we really learned and gained by listening to Dr. Black's paper this evening? Some people don't care to see "Hamlet," nor care to hear Beethoven's "Ninth Symphony" because they heard it before. Poor mortals! Does a grand fact become smaller by repetition? I say it gets larger and larger the oftener it is presented to us. Like every other paper which Dr. Black has given the profession on extension for prevention, this one, though almost entirely devoted to the physical part of the question, treats it with the same broadness and thorough recognition of all things concerned. He may never be able to teach us all to look at the dental environments from the same perspective. He may never be able to erase the belief in the minds of many operators that thorough prophylaxis as understood at the present time may not be equally as safe in many instances as extension for prevention. Be that as it may, he has compelled us by his superior thinking and convincing presentations of the subject, to study all the conditions which enter into the question of extension for prevention.

Every case needs more or less consideration, as I remarked in one of my papers read on the subject, regarding—(1) Environments with special reference to the oral fluids. (2) Age of the patient. (3) Prophylaxis. (4) Enamel rods and their relation to the cavity margins. (5) Esthetics.

The man who fails to take into consideration all of these factors either extends too much or not enough. Dr. Black has shown us this evening that both are equally disastrous. If Dr. Black had not convinced all before this he certainly has proved by his last essay that he does not want us to extend all cavities in a mechanical manner. He has shown us that a profession like ours requires more than mechanical functions. He has shown us that extension for prevention requires the study of each individual case and the study of the individual upon whom extension for prevention is to be practiced.

The really high and difficult part of a profession and of art is the apprehension of what is individual and of what is characteristic. No progressive operator can possibly escape the influence of this teaching, and I doubt whether there ever was any great difference of opinion among the better operators of this country from the very inception of Dr. Black's idea of extension for prevention. As Dr. Black said: "It was necessary to provoke sharp criticisms, which lead to better understandings." We often meet with obstinate adherence to an obsolete and soulless tradition on the one hand, and a rash lust for change on the other. Time brings about a proper balancing of both, and not until that better understanding has taken place will a new idea penetrate into its most useful field. I certainly believe that Dr. Black has made the question of extension for prevention well enough understood today to trust to each and every thinking dentist that the end and aim of this discussion is in the interest of wholesome conservatism.

The essayist said that even under circumstances in which there was every reason to suppose that a recurrence of decay would not take place, he would make a convenience point and extend all the points lingually, cervically, and buccally. That is where I do not agree with him.

Dr. E. K. Wedelstaedt. The subject has been so completely discussed that it will take but a few moments for me to say what I wish.

It has been alleged that wherever I prepared a cavity in the approximal surface of a tooth, I removed all the enamel from that surface. It has also been said that I prepare all cavities in the approximal surface upon which I operate, two-thirds as broad linguo-buccally

as the tooth is thick in that direction. Here we have a case from practice. [Illustrating.] It is a picture of two molars, a bicuspid, and a canine. This is a copy of the conditions as they existed among the teeth in the upper left side of the jaw. You will observe that the molars are normally situated, but the bicuspid is abnormally situated. If we had a cavity of decay in the distal surface of this upper first molar, or a cavity of decay in the mesial surface of this upper second molar, why most certainly it would call for a much different cavity preparation from the cavity preparation that we might make were the distal surface of this bicuspid decayed and we were operating on it. Extension for prevention means that each case as it comes to us should be treated in an intelligent manner. No set and fast rules can be laid down which will govern every case.

To go back to this illustration. Look at the filling in the mesial surface of this bicuspid. Observe the position of the tooth and see how narrow the filling has been made linguo-buccally. That cavity was not extended any more than one-half the width of the tooth linguo-buccally, yet the filling passes all contact with the canine. A comparison of the conditions existing and surrounding the bicuspid and canine with those surrounding these two molars, tells us at once that there must be a difference in our methods of preparing cavities. We must look at this subject in a broad and comprehensive way—in one case, making our cavities broad linguo-buccally, and in another making the cavity but one-half the width of the tooth; in the next, increasing the width of the interproximal space by building out the tooth with gold mesio-distally. We should not, however, confuse this matter of increasing the mesio-distal width of the crowns with the necessity of making a good cavity preparation. Increasing the width of the tooth mesio-distally does not mean that we can leave a mass of unsupported enamel on the approximal surface of that tooth.

Dr. Hofheinz very kindly quoted me in his opening remarks. I wish to return the compliment. As soon as Dr. Black finished his talk, Dr. Hofheinz turned and said to me, "Just think what it would mean to the medical profession had this mighty man devoted his enormous intellect to medicine instead of to our profession. Just think, if you can, what the world would have gained."

In twenty years from now the gigantic work which Dr. Black has made for the consideration of the men in the dental profession will, at least so I believe, be much more appreciated than it is today.

I thank you very sincerely for your close attention to my few words, and I now wish that I had not promised your president to spend only five minutes in the discussion of this subject.

Dr. R. Ottolengui. I want to thank Dr. Black for putting his theories on extension for prevention where they belong —where we can all understand them, and not where some of his too enthusiastic followers have led us to believe he stood.

Dr. Black. I have but few words to say in closing the discussion. I will answer some of the questions asked by my friend Dr. Hofheinz. In the first place, I do not believe we have any such thing as physico-chemical decay. It is all bacteriological. I will say in the next place that when that picture of the incisor tooth was before you, and you saw that clearly outlined white spot, I asked, By what power could acid have been concentrated on that spot?

The existence of the microbic plaque is the only power that will explain it. I want to say a word as to the microbic plaque. It seems that very few have seen it. It is not any kind of scum that may collect on the teeth, composed largely of micro-organisms—emphatically it is not that; but quite a good many of the so-called plaques that have been shown are of that character. The microbic plaque I have in mind is difficult to demonstrate; yet I have demonstrated it. Not only that, but I have also grown it artificially. I am sorry I cannot do so whenever I wish, but there is something about it that is very difficult to understand. Take such beginning decays as I showed you last (buccal decays); wash them

clean with a strong current of water until the teeth seem to be clean about their necks; take a sharp knife, begin at the margin of the surface and peel off, having flooded with water. If you are fortunate you will begin to see a yellowish film appearing over your bright knife-blade. Go on with that, and you will find it covers quite a considerable part of that surface. When you have it peeled, take it to the microscope, and you will find it filled with micro-organisms. You cannot dissolve it in hot water, alcohol, ether, or any of those things. It is practically insoluble. It makes a film over that spot. Acids can go in through it, or sugars or crystallizable substances can go in through it. Remember it is salts—crystallizable substances that pass through these membranes—and we have a crystallizing process. How else could we have such a photograph as I showed on the screen?

I had a talk with Dr. Miller about this last summer. He has looked over these various accumulations on the teeth. I think some day he will see what I have seen, and with his power as a chemist he can explain it to the world better than I can. But it is there, gentlemen. It will require time to give it that demonstration which the subject demands—perhaps a good deal of time yet—because the "say so" of any one man is not sufficient on so important a subject as this.

Now as to the question of Dr. Hofheinz. I think they are all bacteriological. I can recognize the possibility of a purely physico-chemical decay so far as enamel is concerned, so far as softening of dentin is concerned; but it would not be caries as we understand it. There are a good many white spots in the enamel with which caries have had nothing to do. It is a fault in the formation. That we must differentiate from caries in the enamel.

I did not come here to discuss the scientific aspect of dental caries. I came to discuss the physical injuries by caries, and their treatment—a different subject; but the two are very closely related, and let me say in conclusion that one of the faults I find with the dental profession, is that they have not studied the initiation and the steps of progress of the slight decays as they should be studied. Neither have we yet attained to that amount of study of the conditions of susceptibility and immunity that we must arrive at in comparatively the near future.

I want to tell a story, and then I am done. I visited my old home last summer, and one day I was out with my son who is a surgeon. He drove up to his office and jumped out to get some instruments he wanted. I stepped out of the carriage to the sidewalk. Just then a lady came along holding a little girl by the hand. Said she: "Doctor, don't you know me?" I failed to recognize her at the moment. "They are all there," said she, pointing to her teeth. Then I knew who she was. Those fillings in her incisor teeth I placed there when she was eight years old. They were large, broad fillings. I filled for her almost all the approximal surfaces as she grew up, and it was her boast that she never lost a tooth, never lost a filling, and never lost the pulp of a tooth, and "they are all there."

This is what we should do with the children. Remember, my practice was very largely a family practice, such as we can hardly get in large cities. I had the fathers and mothers when they were children, and then their children after them. I could study the conditions of heredity, the conditions of immunity as they arrived—and the large majority of our patients should be immune to decay before they are thirty. This girl had not had any fillings made since I had left her, although she was the mother of three children when I met her again.

A rising vote of thanks was tendered to Professor Black for his admirable address.

Adjournment.

B. C. Nash, *Secretary.*

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PHILADELPHIA, JULY 1905.

EDITORIAL DEPARTMENT.

THE F. D. I. AND ITS SECOND PERIOD.

WE present in this issue the announcement of the coming meeting of the Fédération Dentaire Internationale to convene in Hanover August 7th, at the close of the annual meeting of the Central Verein Deutscher Zahnärzte. As stated in the announcement, the meeting will not be a general one but only of the Executive Council and the Commissions. The F. D. I. has entered upon the second period of its activities, and this meeting will be taken up largely with the evolution of a plan of work to be pursued until this second period is closed at the opening of the Fifth International Dental Congress in Berlin in 1909.

The F. D. I. is essentially an *ad interim* committee of the international congresses—a connecting official link which co-ordinates the several international dental congresses into an organized system. Created originally at the Third Congress of 1900, in Paris, of delegates from all of the countries represented at that great meeting, its first period was comprised between the closing of that congress and the opening of the Fourth Congress in St. Louis in 1904. Annual meetings were held in London 1901, Stockholm 1902, Madrid 1903, and St. Louis 1904. At these several meetings the work of organization was successively perfected and a plan of work discussed and put into active operation. The results of this work in the study of problems of dental education, hygiene, and public dental service, the relation of dentistry to the state, and

kindred questions, are in many respects the most important and valuable contributions which have ever been made within the limits of their applicability.

This is true of the results intrinsically, as well as of their far-reaching importance in an international way. Indeed, it is this latter phase of the question which gives to the work of the F. D. I. its principal value. The organization was handicapped at the outset by a misunderstanding as to its true motive and a lack of definition as to the sphere of its legitimate activities. Fears arose in the beginning that the organization would tend to take on a legislative function and thus centralize power to determine questions of education and of jurisprudence affecting dentistry in a large way. This view was, however, fundamentally erroneous—no such position being practically possible from the very nature of the organization and its international character. Recognizing that any misunderstanding as to the scope and sphere of its activities would seriously interfere with the work of the F. D. I., a definition of its essentially advisory character was incorporated in its by-laws, and its meaning and place among dental organizations was clearly specified in its code of rules and regulations.

The Federation enters upon its second period under most favorable conditions. The indorsement which it received at St. Louis was most cordial and gratifying. The report and recommendations made by the F. D. I. at that congress, and the projected plan of work for its second period, met with the unanimous approval of the congress, so that now it is legitimized as the official body of the congress system *ad interim*.

The place which the F. D. I. occupies in the general scheme of dental organizations is one worthy of careful study. None will question the need for association in matters professional. The dental society is one of the essential factors in the upbuilding and maintenance of our professional structure. In its municipal, district, state, and national aspects, dentistry has its society representations, and the utility of these in promoting all the activities which characterize our craft is clearly recognized. Indeed, these several types of association are the exponents of the thought, aims, and attainment of the profession in relation to its territorial divisions respectively. But all of these divisions of associative effort are limited geographically to certain spheres of action and influence; and while they are quite sufficient within those limits, there are other professional problems that are distinctly international in their relationships, with which the local, state, or national body cannot, in the nature of the case, properly deal.

Dentistry has long ceased to be the exclusive property of any nation or locality. The needs of humanity for efficient dental service have created the means to meet that need in all civilized nations. Hence have arisen educational methods and legislative enactments creating and maintaining standards which each nation has evolved in response to the public demand. These

efforts are in many instances crude; the dental profession as a profession has not existed long enough to have evolved the highest ideals or to have practically realized the best attainable in its educational or legislative results. Among the nations the same deplorable inharmony of method and standard is found as among our several states, and so far as educational standards are concerned the inharmony is even greater. The progress of civilization, which is bringing the world at large to the doors of all nations, is forcing the international problems of dentistry before the profession of the world for adjustment and harmonization. It is the pressing character of these questions that brought into being the international congress, and later developed its official representative the Fédération Dentaire Internationale. The F. D. I. is not, then, the child of caprice or vaulting personal ambition, but the creation of the world's dental profession—an arena in which by consultation and discussion the best ideals may be worked out to a material realization. Its results may then be utilized in so far as they are applicable to the professional work of all nations. Its function is purely advisory, but weighted with the moral force and value which it acquires from the representative character of its *personnel.* It is gratifying that the representative international character of the F. D. I. is now fully assured by the recent action of the British Dental Association at its Southport meeting in appointing a delegation of five of its most distinguished members to co-operate with the Federation in its future work.

THE DISCOVERY OF THE ETIOLOGY OF DENTAL CARIES.

We have before us the souvenir volume reporting the proceedings of a complimentary banquet in honor of Dr. C. T. Stockwell of Springfield, Mass., which we have read with great pleasure as the record of appreciation which the dental profession holds for a most worthy member. Making all due allowances for the enthusiasm begotten of the occasion, it is, however, in the interests of justice both to Dr. Stockwell and to Dr. W. D. Miller that we call attention to what is clearly an error in the historical review of the subject of the etiology of dental caries which formed the basis of the address by Dr. Andrew J. Flanagan, one of those present at the banquet in question. Dr. Flanagan says of a paper by Dr. Stockwell, entitled "Acids or Germs, Which?" published in the *New England Journal of Dentistry,* November 1882, "from this paper dated the beginning of the movement which resulted, within the two or three years following, in the complete overthrow of the older crude notions and theories which had held complete sway and had been the basis of practice up to the date of its issue."

Dr. Flanagan has not read his history aright, for in the paper by Dr. Stockwell to which he refers, the author himself quotes from the paper by Milles and Underwood, read before the International Medical Congress in Berlin in August 1881, as follows: "We consider that caries is *absolutely dependent* upon the presence and proliferation of organisms. That these organisms attack first the organic material, and feeding upon it, create an acid which removes the lime salt, and that all the difference between caries and simple decalcification by acids is due to the presence and operation of germs."

It was this conclusion supported by its experimental evidence which was the bulwark of Dr. Stockwell's defense of the germ theory of dental caries, and it was his belief in the conclusions of Milles and Underwood that inspired his paper, which did so much to bring the subject to the attention of the dental profession in America. The study of the etiology of dental caries was well under way at the time when Dr. Stockwell's paper was published. Prof. W. D. Miller was present at the reading of Milles and Underwood's communication to the Berlin Congress in 1881. He had even at that time taken up the subject, and he pursued it farther in the light of Milles and Underwood's findings with the view of determining the nature of the acid which was the active solvent in dental caries. This he finally did, and, as we well know, proved the agent to be lactic acid produced by the action of caries-producing fungi acting on carbohydrate material. Miller's first communication on the subject of this research appeared in Klebs' *Archiv für Experimentelle Pathologie und Pharmacologie,* Bd. xvi, October 1882, a month before the publication of Dr. Stockwell's paper on "Acids or Germs, Which?" in the *New England Journal of Dentistry.*

Dr. Stockwell's service was valuable in so far as he drew attention to the subject and aroused professional interest in the discussion. But the researches which led to our present knowledge of the etiology of dental caries were well under way before Dr. Stockwell's paper appeared. Indeed, one of them, that of Milles and Underwood, was evidently the source of his inspiration, as his paper clearly shows, and Miller's first paper on the subject antedated Dr. Stockwell's one month in time of publication.

These facts are published not with the slightest desire to minimize the prominent and valuable part taken by Dr. Stockwell in the elucidation of this important question, but as a matter of justice and historical accuracy, features with which we feel sure none will be more in accord and sympathy than the gentlemen immediately concerned.

BIBLIOGRAPHICAL.

ANATOMY AND PHYSIOLOGY OF THE MOUTH AND TEETH. By Dr. E. SAUVEZ, Professor at the École Dentaire de Paris. Second Edition, revised and enlarged by Mons. WICART, Interne des Hôpitaux, and G. LEMERLE of the École Dentaire. Paris: J.-B. Baillière et fils, 1905.

This the second edition of Dr. Sauvez' manual on the anatomy and physiology of the mouth and teeth has been thoroughly revised and enriched by the addition of valuable information on the development of the bones of the face. The work of revision has been carried out in a most satisfactory manner by his two assistants, Messrs. Wicart and Lemerle.

The work is divided into two distinct portions—Part I, devoted to the anatomy of the head and neck; and Part II, exclusively to the anatomy of the dental organs. The chapter on the embryology of the bones of the face is worthy of special notice, as the author has so thoroughly covered the subject that from its perusal the student will gather without difficulty an excellent conception of this perhaps the most complicated part of human anatomy.

He touches on the question of the etiology of the two most common facial and palatal deformities, namely, harelip and cleft palate, reviewing some of the more important theories promulgated up to date on the errors of development responsible for the production of these malformations.

The chapters on the temporo-maxillary articulation, on the muscles of the head and neck, on the arteries, veins, and lymphatics of the neck, on the cranial nerves, and on the structure of the mouth, tongue, pharynx, and salivary glands, exemplify the efforts of both author and reviser to carry the work to a level harmonizing with the importance of the subjects of special anatomy and physiology in the curriculum of the dental course.

Part II, which as above stated treats exclusively of the structure and function of the teeth, is a worthy continuation of Part I. The teeth are studied individually, and the descriptions although short are sufficiently explicit to render them valuable to the student and likewise to the busy practitioner.

The little volume is issued in an attractive way, the typographical work being in keeping with the commendable results accomplished within its pages by author and revisers.

J. E.

REVIEW OF CURRENT DENTAL LITERATURE.

Conducted by JULIO ENDELMAN, D.D.S.

[*Münchener medizinische Wochenschrift*, February 7, 1905.]

PROPHYLAXIS OF MERCURIAL STOMATITIS. By Dr. J. Almkvist.

The prevention of that type of stomatitis brought about indirectly by the elimination of mercury through the mucous membrane of the mouth is the subject of Dr. Almkvist's interesting communication. The preventive treatment consists in placing the teeth in as healthy a condition as possible before the mercurial treatment is begun. The gums should be massaged daily, using alcohol in connection with the friction movements, for, as is well known, this agent has the power of hardening tissues. The teeth should be kept scrupulously clean and brushed frequently with the following paste:

Potassium chlorate,		gm. xxxvi;
Sodium benzoate,		" iii;
Powdered white soap,		" iv;
Sodium biborate,	āā	" viij;
Glycerin,		
Aromatic essences,		" j.

[*Dental Summary*, June 1905.]

RETENTION OF ARTIFICIAL DENTURES. By George H. Wilson, D.D.S., Cleveland, Ohio.

The methods of retention may be classified under two general headings: First, by means of the soft tissue; and second, by means of the remaining teeth. The methods for retention included in the first class are retention by contact, atmospheric pressure, and spiral springs. Those included in the second class are spring plates and various forms of clasps and ferrules.

In the retention of plates, leverage is a factor of considerable importance. The author speaks of leverage as positive when it aids in retaining the denture and negative when it tends to displace it. Most full and partial plates are retained by contact. This force may be represented by a fractional part of an ounce, or several pounds pressure upon a denture. The oval-shaped arch and vault are most favorable to this kind of retention, while the V-shaped and very flat arch are less favorable.

Adhesion by contact is best secured by uniform pressure and absolute contact. Uniform pressure is obtained by the use of accurate impressions, making additions to the cast, and in rare cases by carving the cast. The author confines all modifications to the cast. If there is excessive soft tissue over the vault where the periphery of the base-plate will rest, it should be compressed while taking the impression, also the gum portion should be forced by the impression into position in which it will do the least harm. A good rule is never to make any additions to the alveolar process except when there is localized hypertrophy of the hard tissue. No matter how hard the alveolar ridge may be, if it be uniform it cannot be improved. In no case should an addition be made to a normal portion of the alveolar ridge for the purpose of increasing the pressure upon the soft tissue; it will only tend to cause instability. In cases of lower arches with a thin sharp ridge covered with tense tissue, relief must be given in order that the pressure of mastication will not fall heaviest upon the knife-like edge of process. For additions to the cast the author recommends tin foil No. 60. The foil may be added to the cast in one, two, or three layers by attaching each layer with sandarac varnish. The varnish for this purpose should contain twice as much sandarac gum as that used for separating purposes. The rhaphé formed by the union of the maxillæ marks a location upon which pressure must be relieved. There are a few cases where this area is covered by so much soft tissue that no relief would be necessary. Usually it is only necessary to relieve the highest portion of the vault without interfering with the distal edge

of the plate or extending upon the alveolar ridge. In extreme cases of hypertrophied rhaphe the author recommends to cut out the vault portion of the plate and to depend upon clasps to hold the denture where there are teeth remaining to which clasps may be attached. In the case of metal base-plates all prominent portions are more compressed than the less exposed ones, and therefore this condition must be taken into consideration in preparing the metal for the die. In all cases, should there be heavier pressure upon the vault portion than upon the alveolar ridge, the unrelieved portion of the vault will become a fulcrum, and when the jaws are closed upon a morsel of food at one side of the mouth a lever is formed which will dislodge the denture; thus it logically follows that uniform pressure, or at least perfect adaptation of the alveolar process, is absolutely necessary.

[*l'Odontologie*, Paris, May 30, 1905.]

TREATMENT OF PYORRHEA ALVEOLARIS. By M. Barrie, Paris, France.

The author reports favorably on the treatment of this malady. His method consists in cauterizing the diseased sockets with the thermo-cautery and in injecting between the roots and alveoli solutions of adequate strength of mercury bichlorid in distilled water. This procedure, together with the firm splinting of the teeth, is considered by Mons. Barrie as a method *par excellence* in the therapeutics of pyorrhea alveolaris.

[*l'Odontologie*, Paris, May 15, 1905.]

THE ENTAMŒBA BUCCALIS. By Drs. Leyden and Lœwenthal.

At a meeting of the Society of Charity Physicians of Berlin, Drs Leyden and Lœwenthal showed specimens of the *Entamœba buccalis*, which they found in the mouth of a patient suffering from a cancerous growth of voluminous size upon the floor of the mouth. The salivary secretion of the patient was abundant. Professor Leyden invariably examines the saliva in cases of cancer of the mouth, and that of the patient in question revealed the presence of those amœbic bodies discovered by Prowazek in the débris from carious cavities, and which he has designated as "entamœba buccalis." This organism lives in layers of organic deposits found here and there upon the mucous membrane of the mouth. When properly cultivated numerous colonies develop. It is not found within the tumor, and consequently, at least in the case under consideration, it cannot be considered an etiological factor in cancer.

[*Revue Odontologique*, May 1905.]

DEATH CAUSED BY DENTAL CARIES. By Professor Broca, Paris.

Professor Broca has repeatedly called attention to the possibility of serious phenomena developing within the substance of the jaws consequent upon neglected cases of dental caries.

In this communication the author describes the case of a boy aged four who presented, at the time of his admission to the Hôpital des Enfants Malades, severe symptoms of infectious nature. The right peri-auricular, parotid, and angulo-maxillary regions were tumefied and edematous. There was a discharge through the external auditory meatus of some serous turbid liquid. The diagnosis of septic complications of auricular origin was rejected by Professor Broca, for the reason that while the post-auricular region was of normal appearance and absolutely painless, the area over the body and ascending ramus was extremely painful to pressure. The diagnosis was consequently changed to osteomyelitis of the jaw.

The interior of the mouth could not be examined owing to a forced contraction of the masseter and internal pterygoid caused by the inflammation around the ascending ramus; but the examination of the vestibule alone at once pointed to the cause of the disturbance. From around the gingival margin of the lower right first molar pus was being discharged in large quantities. The patient's temperature was about 105, the pulse small and rapid, and the color of the skin grayish. The urine contained great quantities of albumin.

The surgical intervention consisted in the immediate extraction of the teeth the seat and origin of the pyogenic invasion. On the following day, with the patient properly anesthetized, a deep incision was made along the lower border of the mandible. From under the periosteum about two drams were removed of a brownish, fetid, and hematic dis-

charge. The operation improved the local condition, but did not relieve in the least the systemic symptoms. The temperature went down about two degrees during the next day, but went up again to about 105, and on the third day the little patient expired.

It is probable that had the diseased tooth been removed as soon as the abscess developed the case would not have had a fatal termination. Lower deciduous teeth the seat of acute abscesses should be treated without loss of time, and extracted at once if the abscess should not respond to ordinary treatment. The mandible, because of the nature and arrangement of its component tissues, is more exposed to the ravages of pyogenic infection than any other bone of the face, and furthermore, as shown by reliable statistics, is more often than the maxilla the seat of necrosis and other inflammatory phenomena. An abscess upon a deciduous root should be considered a far more serious disturbance than a similar pathological condition affecting a permanent root. Therefore proper treatment should be undertaken at once, for if the case be neglected the consequences may become so serious as to endanger the life of the child, and in some cases, as in the one under consideration, terminating fatally by inducing a state of general toxemia from which the already debilitated child's organism is powerless to recover.

[*Dental Review*, Chicago, June 15, 1905.]

SEVEN PECULIARITIES OF THE LEFT SIDE OF THE MOUTH. By Dr. L. P. Haskell, Chicago.

The author states that for twenty-five years he has been calling attention to seven distinct peculiarities of the left side of the mouth. He enumerates them as follows:

(1) In 95 per cent. of edentulous maxillæ there is a peculiar depression over the left canine eminence, requiring more fulness of artificial gum.

(2) In a great majority of cases the alveolar process is shortest on the left side, below the canine eminence, necessitating the arrangement of the teeth lower than on the right side.

(3) In 98 per cent. of jaws the tuberosity is lower on the left, often to a great extent, requiring shorter molars, and preventing the insertion of second molars.

(4) In very many mouths the lip rises highest on the left side in talking and laughing, causing the teeth to appear too long, while the arrangement should be parallel with the lip at rest.

(5) On the mandible the teeth in many cases are higher and more prominent on the left side, making it difficult to avoid arranging the upper teeth too short.

(6) The left side of the maxilla often diverges farther from the median line than the right, necessitating setting the teeth farther over the ridge.

(7) It is often the case that there is more absorption of the left side of the mandible.

[*Therapeutic Gazette*, Philadelphia, March 1905.]

LINGUAL GOITRE. By Dr. Storrs.

The author describes a rare disease, which, however, he has been able to illustrate by thirty-three cases collected from literature. It is noted that it occurs more often in women than men, this being contrasted with the accessory thyroids, which are much more frequent in men. It may occur in any period of life, but it is usually noted between the ages of fifteen and forty. These tumors are usually placed on the dorsum of the tongue, generally just behind and below the foramen cæcum, but sometimes inclosing it in their growth, and on the median line as a rule; they are round or ovoid, and vary in size from that of a cherry to that of a man's fist. The surface of the tumor is covered with mucous membrane of the tongue. There is generally no ulceration. The troubles caused by it are purely functional, and vary in proportion to the size of the tumor. The first symptom is generally an uncomfortable feeling at the base of the tongue, a fulness in the throat, accompanied by a frequent desire to swallow. The voice then begins to change. Deglutition may be seriously interfered with. One characteristic of lingual goitre is the occurrence of profuse hemorrhages. These occur at any time and without any apparent cause. They are unaccompanied by coughing, vomiting, or pain, and the patient is simply aware that her mouth is filled with fluid, which on expectoration proves to be blood. These hemorrhages are due to the rupture of one of the many vessels covering the mucous membrane of the growth. The

tumor is painless and elastic, and usually it can be felt only by the fingers placed in the mouth. The prognosis is favorable. Treatment consists in removal. This may be accomplished by the galvano-cautery loop, or by incision with enucleation. The latter method is distinctly preferable, and since the tumor is well defined and not adherent, it is accomplished readily. Enucleation through the mouth is the method usually employed. After etherization, the jaws are kept open as far as possible by means of a gag. A silk ligature is then passed through the tip of the tongue for traction, and a second ligature passed through the muscles of the base of the tongue under and below the mass of the tumor. The second ligature renders traction on the tongue quite easy, and after enucleation is of great assistance in controlling the hemorrhage and in approximating the edges of the wound. The tongue is then drawn forward as far as possible until the tumor appears between the incisors. A longitudinal incision is made in the growth and the tumor enucleated. The redundant mucous membrane on either side of the wound is then trimmed off and the edges brought together with catgut sutures.

PERISCOPE.

Root-Canal Filling Material.—Gutta-percha base-plate, weigh one-half ounce; saturated solution of thymol in eucalyptol, measure one-half ounce. Dissolve gutta-percha in chloroform, add thymol and eucalyptol, and mix thoroughly. Allow chloroform to evaporate. Dry the tooth and work the above into canals with warm broach, forcing to apex with a soft piece of rubber and insert gutta-percha cone.—B. L. COCHRAN, *Dental Review.*

Thigenol.—Saalfeld (*Jour. de mal. cut. et syph.*, November 1904) experimented with this new substance, put forward as a succedaneum to ichthyol. It is a composition of iodin and ichthyol, in which occurs 10 per cent. of sulfur in an organic state of combination. Thigenol possesses a dark-brown color and a syrupy consistence; is inodorous, almost insipid; soluble in water, alcohol, and glycerin. Applied to the skin it dries rapidly, and it does not stain the linen. It is a vaso-constrictor, is useful in inflammations, is drying, and favors resorption.—*American Journ. of the Med. Sciences.*

Atrophy of the Entire Skin of the Face Caused by Roentgen Rays.—Dr. Nobl (*Proceedings of Wiener Derm. Soc.*, February 10, 1904) reports the case of a man, aged thirty years, who was treated with the rays for a chronic sycosis, fifty sittings, at a day's interval, five to ten minutes each, at 20 centimeters' distance, having been given. During all this long period there occurred no active reaction. The atrophic lesions developed late, and for two years subsequently had undergone no further change. The skin everywhere was thinned and had a vitreous look, with slight scaling and very fine fissures, the lines being similar to those of old age. The epidermis was rough, like tissue paper, beneath which the skin was red, showing vascular ectasias and numerous relics of the sycosis.—*Amer. Journ. of the Med. Sciences.*

To Band a Logan Crown.—Trim the root down to the proper shape by grinding it a little so the ferrule will fit tight under the gum. Make ferrule, and solder cap on to it. Place it on the root. Select the crown, take your carborundum wheel and cut away the palatal edge of the upper end of the crown, take a thin piece of gold plate, such as is used for inlay work, stick the crown pin through it, and push it back against the crown. Now take some borax wax and stick the pin through it and press it to place on the root. Take it off with the ferrule, trim away the wax first as you want the finished crown. Invest with just the wax exposed at the palatal portion of the crown, heat up gently by heating the porcelain first and flow solder where the wax was, and let the pin cool off first. This I consider one of the best crowns made. J. T. PHELPS, *Dental Hints.*

Fulminant Caries Alveolaris Specifica.—Arkövy (*British Medical Journal*, Nov. 19, 1904) under the above title writes upon an acute alveolar inflammation commonly char-

acterized as "pyorrhea," the term specific implying not that it is of syphilitic nature, but that it is associated with true caries. The affection in its chronic form is of course well known, but that it may appear suddenly, with pain, often severe constitutional symptoms, and the formation of multiple extra-alveolar abscesses, is not so well recognized. The treatment is much like that appropriate to a chronic pyorrhea. The tartar deposits are removed from the roots. Stimulating, even cauterizing, applications are employed, such as hydrogen dioxid or aromatic sulfuric acid; and since the severe pain is due to gangrene of the pulp, opening into the pulp-cavity is indicated. The teeth usually regain their former firmness if treatment is prompt. These fulminant attacks only occur in cases of chronic pyorrhea; the abscesses communicate through the inter-alveolar septa, which are necrosed. The pain is usually agonizing in intensity and obstinately persistent, and there is an associated diffuse gingivitis.—*Therapeutic Gazette.*

Method of Treating the Under Surface of a Porcelain Inlay to Secure Maximum Adhesion of Cement.—Of a method of treating the surface of a porcelain inlay so that there will be a chemical continuity of structure when cement is applied, I will give a description. It has been found that zinc oxid as available in the usual cement powder can be so fused to a surface of porcelain, that cement applied thereto will literally unite them and become continuous with the particles of zinc oxid present. This can be accomplished for retention of an inlay by painting into the matrix, keeping back of the edge, of course, a mixture of two parts of cement powder and three parts of the porcelain body about to be used, the merest film being the proper quantity. If the matrix be then filled with plain porcelain and the inlay fused and completed as usual, there will be presented, on stripping off the matrix, a glazed surface which can be easily broken, exposing a thin, porous layer, which not only gives mechanical retention similar to an etched surface, but presents zinc oxid particles with which the cement will become continuous, as has been said. If it is desirable to give to a finished inlay such a surface, a mixture of zinc oxid and a porcelain of a lower fusing-point can be used for fusing upon the reverse surface after compensating in some way for this slight layer. This, I believe, will give the maximum adhesion of cement to porcelain, and if then a cement be used which will properly knit to dentin, the danger of displacement of porcelain inlays ought to be reduced to the minimum.—W. V-B. Ames, *Dental Hints.*

[Dr. Charles H. Land in a paper printed in the Dental Cosmos for June 1903, described a method of producing a film or coating upon the under surfaces of inlays which would cause complete union of the porcelain with the cementing substance. The procedure which Dr. Ames here describes is identical with Dr. Land's original suggestion.—Ed.]

A New Method of Generating Formaldehyd for Fumigating Purposes.—Formaldehyd generators now on the market are, as a rule, complicated, expensive, frequently out of order, and thereby requiring almost constant repairing. Fumigation by this means consequently necessitates an amount of time which is often a grave objection to its routine employment. The heating of solidified formaldehyd or paraform in some simple apparatus by means of burning charcoal is also objectionable, in that volatilization may take place as paraform and not as formaldehyd, or the solidified compound may be destroyed—partially, at any rate—by combustion. By this latter method, too, much efficiency is lost on account of the absence of moisture. The necessity of burning fuel in a closed room is also a serious objection to the use of paraform. A simple substitute has lately been suggested by Walker which is open to none of the above disqualifications, and which in routine work acts with admirable efficiency and rapidity. It consists simply of mixing solutions of formaldehyd with unslaked lime. This, as is known, will release formaldehyd gas, the only precaution being that enough lime must be used to combine with all the water present. Secondary reactions between the lime and the formaldehyd may be prevented by the use of alum, which converts the lime into insoluble calcium sulfate. In practice five pounds of commercial aluminum sulfate are dissolved in one gallon of hot water, and this solution is mixed with three gallons of 40 per cent. formaldehyd solution. Eight ounces of this mixture and one pound of lime are used for each one thousand cubic feet of space to be fumigated. The lime should be in small lumps and of a sample which slakes quickly in cold water. In that the method is cheap and free from all danger of fire, it is greatly to be recommended for wholesale fumigation. In addition, it is wholly practical in municipal work; in Brooklyn lately it gave 90 per cent. of successful fumigations, with the bacillus pyocyaneus used as the test organisms.—W. H. C., *Lancet-Clinic,*

After-effects of Pulp-extirpation under Cocain Pressure Anesthesia.—In consulting my records, I find that I have employed arsenic for the destruction of the dental pulp in twenty-three per cent. of the cases, and cocain in seventy-seven per cent. As to my experience with immediate root-fillings after removal of the pulp with cocain, I will say that in the very great majority of cases there is developed some soreness in the apical region. This soreness I find varies greatly with the amount of cocain used, and the amount of hemorrhage following the extirpation. If too much cocain is used, that is, if the pressure employed is applied for too great a period and the cocain passes beyond the apex of the tooth into the apical space, much soreness sometimes develops. In some cases this soreness, no doubt, is due to the action of the cocain itself, while in others the soreness follows because of a wounded and lacerated condition of the tissues in the apical space, such a condition resulting because of the passage of the broach through the foramen. When the cocain has passed through and anesthetized the tissues, such a thing may and does often happen.

In immediate root-filling following the use of cocain in cases in which there was a copious hemorrhage, my results have been usually unsatisfactory, both to my patient and myself. The soreness in these cases results, no doubt, from the engorgement due to the hemorrhage in the apical space. In the cases in which I feel that I have carried the anesthesia to the right point, in those cases where I find small apical openings to the root-canals, and in those cases where there is little or no hemorrhage, I have sometimes resorted to immediate root-canal filling, with very little, if any, soreness resulting. I find that I have practiced immediate root-filling in twelve per cent. of the cases. However, my experience teaches me to seal in the canal for a few days, some mild sedative agent, following the use of cocain for pulp-extirpation. Such a practice gives me the best results.

In comparing the results of treatment by the two methods, I do not know that my observations and notations are extensive enough to warrant a statement, but I cannot say that I should want to take up either method, and discard the other. Each has its advantages and disadvantages. One will serve me better at times, under certain conditions and circumstances; the other, better at other times, under different conditions and circumstances. Neither method need cause any very material after-soreness. Each must be employed with wisdom and common sense, with some understanding of the agent, its effect, the proper method of application and after-treatment.—F. W. Parker, *Dental Review.*

Some Means of Obtaining the Maximum Adhesion of Cements.—The first point that I wish to make is that I believe that the question of extreme dryness of dentin surface is over-emphasized as a preparation for the cementing of an inlay. I will grant that a thorough cleansing of extraneous substances such as mucus and other salivary ingredients, etc., is to be insisted upon, and possibly a desiccation of the superficial dentin; but I believe that it is thoroughly impractical and unscientific to expect to be able to flow a proper mix of cement upon this desiccated surface and have it give the maximum of adhesion, because the cement will simply bridge across the microscopic irregularities of this surface. Granting that thorough cleansing and superficial desiccation is desirable, I will claim that we should then thoroughly moisten this surface with the liquid of the cement we are about to use, or, possibly better, some plain syrupy phosphoric acid, and after being satisfied that this has caused the displacement of air in all inequalities of the surface, all visible surplus of this should be removed by air blast or absorbents. I say visible surplus, because this will not be removed by absorption or evaporation as would aqueous moisture. This non-vaporizable material will persistently remain as a mere moist surface which will carry the cement into the irregularities of surface, just on the plan that we would moisten the surface of a plaster impression before attempting to properly pour upon it the plaster, or that a brick-mason moistens a porous brick before applying his mortar. It will be readily appreciated that the success of this depends on having no excess of this liquid. On the supposition that adhesion of cement to dentin depends upon a knitting of the integral particles of the cement into the inequalities or tubuli of the dentin, we can reasonably contend that the form of these integral particles will decide to a very great extent the amount of adhesion afforded. To refer again to the use of mortar by a brick or stone mason, we will call attention to the fact that in selecting a sand for such a mortar, a round seashore sand is avoided and a sharp river sand selected because the angular particles of this variety will be more insinuating when applied to an irregular surface, *i.e.* there will be a more intimate knitting of these particles to the irregular surface. On this plan I think that I can demonstrate that a cement in which the integral particles are angular

crystals will to a remarkable extent more firmly attach itself to a dentin surface, than one in which the integral particles are well-rounded, more or less microscopic bodies. —W. V-B. Ames, *Dental Hints.*

Pointers on Cocain Anesthesia for the Extirpation of Pulps.—In my experience there have been cases in which it was impossible to obtain anesthesia with cocain. I believe the explanation of that is to be found in an hyperemic condition of the pulp. The pulp is in an extremely hyperemic condition, under unusual blood pressure, the bloodvessels filled, and crowding the tissues; it will be impossible to make that tissue take up cocain. I have worked and worked over them. In some cases I have succeeded in extirpating the pulp by main force and brutality, and in others I have applied arsenic and removed the pulp without trouble. As the result of my experience I have come to know that cocain is useless, if the symptoms indicate a chronic, long-continued inflammation, or an extremely acute hyperemia. In such cases I employ either a treatment calculated to reduce the hyperemia, or an application of arsenic, depending upon the symptoms which precede it. If the patient has been suffering acute pain for twenty-four hours previously, to make an arsenic application at that sitting would result in a worse toothache than ever for the next twenty-four hours. But if it is a relapsing pain, appearing and disappearing, an arsenic application without pressure will not cause unbearable pain. If the symptoms indicate a condition which is certain to result in pain from the arsenic application, I use ninety-five per cent. carbolic acid, or beechwood creasote, or after twenty-four hours remove it, and try the cocain again. Often the cocain will work at the second sitting where it failed at the first. If it does not, the arsenic almost invariably will. I have seen one or two instances of trouble following the removal of pulps with cocain and immediate root-filling. One was shown me about two years ago. It was a lower third molar, from which the operator, a very successful man, had removed the pulp under cocain anesthesia, and filled the root at the same sitting. His description of the condition for the forty-eight hours following was graphic. At the end of that time he extracted the tooth, and he showed it to me with gutta-percha protruding from all the roots. My explanation of that was, that in the application of the cocain he had anesthetized not only the pulp but the pericementum, and consequently failed to obtain his signal for complete root-filling—that is, the symptom of slight pain which he had learned to depend upon as indicating that his root-filling had reached the apex, and so he had pushed the root-filling through the apex. I believe, on the other hand, there is pain after root-filling because of imperfect removal of the pulp, leaving portions in the tissue, either alongside the root-filling or beyond it. I think you will always have trouble from both these sources, no matter how skilful the operator may be, because root-canals are not always straight.—F. B. Noyes, *Dental Review.*

Rules for the Successful Application of Cocain Pressure Anesthesia.—First: A strict observance of all principles governing aseptic operations, and this means that in every case the rubber dam ought to be applied, and the cavity or tooth thoroughly dried and disinfected by the best possible means. All instruments should be sterilized, and a fresh, sterile solution of cocain used in each case.

Second: No more of the anesthetic should be used than is necessary to make the operation painless. The more profound the paralysis the more prolonged will be the time for recovery of the cells thus affected. Microorganisms which have gained entrance either through the solution used or through the blood and lymph channels, may gain a foothold before the cells of the tissue have fully recovered. My first clinical experience with this method happened to be an easily accessible cavity, and on this account, perhaps, the time limit was greatly exceeded—so much so that there seemed to be absolutely no feeling in the cavity or tooth for at least thirty minutes after the cocain was applied. This is a point, it seems to me, that ought to be closely watched. The cavity or the pulp should be tested at short intervals to determine whether sensation is lost or not. In case of the pulp, that test can only be applied when there is an exposure. Thus far our experience would suggest that the maximum time limit be fixed at one minute, when there is no leakage.

Third: Either a weak solution or a limited amount of a stronger one is another principle that it would be well to bear in mind. By properly controlling the pressure, we can, to a certain extent, at least, limit the amount of the local anesthetic used. Just as in the administration of a general anesthetic, pleasing results can be obtained by its careful and limited use that cannot be obtained in any other way. Cocain readily undergoes chemical changes in its composition, so that solutions for use should be made fresh as re-

quired. Its anesthetic properties are destroyed by boiling, views to the contrary notwithstanding.

Inasmuch as cocain produces its characteristic effects by paralyzing the nerve-endings, the less constriction there is produced in the bloodvessels the better, because the reaction depends very largely upon the amount of disturbance there has been produced in the blood supply. For this reason, I cannot see what particular advantage would be gained in the end by using a special astringent, such as adrenalin chlorid. So powerful an astringent as this makes a bloodless operation a possibility, but it also greatly increases the dangers from secondary hemorrhage, and not infrequently other serious complications. Two cases at least that I have in mind—both operations upon the nose, and in which a combination of cocain and adrenalin chlorid was used—have clearly demonstrated to my mind, at any rate, that there is more truth than fiction in the above statement. In the one case there was an unusual amount of trouble from secondary hemorrhage; in the other, erysipelas was the complication, brought about, undoubtedly, through the profound debility produced in the tissue cells, thus rendering the parts more susceptible to infection.—E. T. Loeffler, *Dental Register.*

On the Origin of Cocain Pressure Anesthesia for the Painless Removal of Pulps.—When I attended the American College of Dental Surgery, early in 1890, Dr. Ingersoll gave us his experience in trying to compress water when a boy. He had heard that water could not be compressed, but he had an idea that it could be, so he bored a hole in the end of a log, and filled it full of water and drove in a peg. When the peg went in he was satisfied that he had the water compressed, but upon further investigation he found he had driven the water through the log. It occurred to me at that time that as the log was porous and water could be driven through it, something might be forced through teeth, as they are also porous. I did not have an opportunity at that time to experiment along this line, but kept studying the subject, and talked with several of my friends about it. When I went into practice the latter part of the same year, I began to experiment with cocain and other drugs. I had heard that cocain has no effect when placed on the external skin, which I found to be true under ordinary circumstances. I had a wart on my knuckle. I saturated a pledget of cotton with a ten per cent. solution of cocain, placed a rubber tube over the stem of my chip-blower, with the cotton in the other end of the tube, put the tube over the wart, and brought pressure to bear on the cocain. When I thought it was forced long enough I cut the wart out completely with a pair of scissors, without a bit of pain. This encouraged me, and I continued to study how we could force cocain through the teeth. After devising different instruments which did not work very well, it finally occurred to me that a cavity in a tooth was advantageous to this operation, from the fact that the walls of the cavity would confine the medicine. I tried that; and the first tooth on which I was successful was an upper central incisor. I placed the cocain in the cavity, covered it with a piece of soft rubber, using a burnisher to force the cocain in, and took the pulp out without pain. Subsequently I operated on all the teeth from the incisors to the third molars, in some cases with good success, and in others none at all. Although I have studied the question a great deal, I have never been able to decide why I have been successful in some cases and unsuccessful in others. No stage of inflammation seemed to interfere with the success of the operation. In only one case has it been necessary to extract a tooth in which I had used pressure anesthesia; that was a lower third molar. I have noticed that where I was able to operate on either one or both parents I have also found the children susceptible to cocain. I found, also, that some brands of cocain are practically worthless for the operation. I have filled roots immediately after the use of cocain by pressure and had good results; in other cases bad results. I have done the same where arsenic was used, and got both good and bad results. Let me say to those having trouble: Before applying the cocain I put a few fibers of cotton on a broach, dip that into carbolic acid, and have it lying ready, and after the pulp has been exposed I always apply carbolic acid, so that if the pulp is not thoroughly anesthetized, I am certain the part touched with the acid will be anesthetized next time. If there is a little sensitiveness I give the broach a quick push, and that cauterizes the balance of the area, and I find I can get the pulp out without further trouble. I generally try to guide the broach down along the wall of the pulp-canal, sliding it between the membrane and the surface of the root.—L. L. Funk, *Dental Review.*

HINTS, QUERIES, AND COMMENTS.

THE BANDLESS PORCELAIN CROWN.

After several years I have concluded that for incisors, canines, bicuspids, and molars the so-called Richmond crown, the baked porcelain crown, or any other crown with a band is not fully up to that high standard of excellence which is demanded when it becomes necessary to replace the natural crowns of the teeth.

In presenting this communication it is not my purpose to extol the merits of a new crown, but rather to direct attention to some of the advantages resulting from the use of bandless baked porcelain crowns.

Of the disadvantages of the latter, first perhaps in importance is the irritation of the gum, resulting from the presence of the band underneath the free margin of the gum. Although the band may be fitted with great care, so that apparently there is no projection between the band and the root, and even though it may be ever so thin, it acts as a foreign body and is a constant source of irritation, however slight it may be. If the band is fitted so as to be entirely under the gum, it is the observation of the critical dentist, observing the results from the Richmond crown, that the band not only becomes visible after a short period of time, but more than that, at the point of junction between the band and root there is a seat of irritation, resulting in absorption and its sequelæ.

It is not natural to have any foreign substance occupying the space between the free margin of the gum and the tooth. After the gum has receded from the band, the portion exposed becomes unhealthy, invites decomposition, resulting in decay.

It should be our constant endeavor to conceal the line of junction by our art, therefore some method should be followed whereby the joint between the crown and the root can be thus permanently concealed. As the gum will sooner or later recede from the band, the latter will then be exposed to view.

At the base of the body of a baked porcelain crown with a band there is a space between the porcelain and the platinum cope, since porcelain and platinum do not unite. This space in many cases causes a dark blue line to appear at the joint between the porcelain and the metal. This latter unsightly and inartistic condition is due to the penetration and decomposition of secretions. It is impracticable to prevent the darkening in the region of the cope of the crown from being transmitted to the porcelain at its base, thereby causing an unnatural apearance.

Among the advantages of a bandless porcelain over any crown with a band are the following: A bandless baked porcelain crown when plate, post, and facing are used—if the plate is properly burnished to the root to be crowned, and the facing soldered to the post, the facing being ground so as to have the same contour as the end of the root and polished so as to have a smooth surface throughout—is perfectly healthy and non-irritating to the gum, because it has practically the same contour and a similar surface to the original tooth. The gum between the crown and the tooth will remain intact and perform its normal function, and the liability to irritation is reduced to a minimum, since the crown and the root form one continuous smooth surface, and are more harmonious to the gum tissue.

In the Logan crown the union between the crown and the pin is the strongest that can be obtained, because the crown is constructed of one mass of porcelain, which has been molded and baked with a high-fusing body. I cannot see any advantage in confining one's efforts to the use of any style of crown which does not afford the greatest possible variety of molds and shades for selection, and none of the ready-made crowns are made in as large a variety of molds and shades as the ordinary facings. It is my belief that all-ready-made crowns should never be adopted, as they were originally designed and intended for no other purpose than temporary crowns.

In the baked bandless porcelain crown as I make it, the root is ground even with the gum margin by the use of a thin carborundum wheel. The root is trimmed to the free margin of the gum with a convex surface, and cut under the gum on the labial and lingual sides as far as possible without injuring the gum. The end of the root is made to follow the outline of the gum, being highest on the labial and lowest on the lingual side. By cutting the root in this manner the strain from the lingual side comes upon the lingual portion of the root, and upon the porcelain in its strongest part. By cutting the groove in the center of the root from labial to lingual side there is more space for the porcelain around the post. This lessens the rotary movement, and gives more space for fusing the porcelain to the facing and also lessens the tendency of the plate in baking to draw up from the lingual part of the root, reducing the liability of fracture of the baked portion of the porcelain that is baked to the facing.

The cutting of the groove and trimming the edges of the root is best done with a large inverted cone bur at high speed. If the handpiece be held firmly, and a sharp bur be used, there is but slight discomfort to the patient. My reason for trimming the root under the gum is that the joint is entirely protected by the gum, and the porcelain of the crown being smooth there is no room for accumulation of food, and there will be no recession of the gum.

The most permanent means of attachment of a crown is by cement. Another objection to a crown with a band is mounting the crown upon the root. After the canal has been dried and filled with cement the crown is forced into its proper position, and the only means of exit of the surplus cement being between the band and the root, the cement is forced against the gum, thereby causing the patient to suffer pain from the pressure and irritation of the cement. When the bandless crown is set the surplus cement flows straight out from between the crown and the root without inconvenience to the patient.

In fitting the bandless porcelain crown to the root, if the same care is taken as in fitting the band by the operator, the natural crown of the tooth can be reproduced in every way; you have a crown as nearly perfect as any crown can be.—Ulysses M. Richardson, Chicago.

PORCELAIN IN LARGE LABIAL CAVITIES.

In this class of cavities I have found that an impression can be readily and accurately made in the following manner:

First, make a die by pressing a soft piece of impression compound into the cavity tightly. Harden under a stream of cold water and remove. Then place the platinum over the cavity, holding loosely, and with another piece of compound gradually force to the bottom. By careful manipulation this can be done without breaking the platinum.

Insert the die, which will adapt the impression at every point. Remove the die, and burnish the edges, either before or after the first bake, according to the operator's individual method. This can also be used to advantage in other large cavities easy of access.—Chas. A. Turner, Statesville, N. C.

OBITUARY.

HANSFORD DEWITT BOYD.

Died, at Troy, Alabama, April 25, 1905, Hansford DeWitt Boyd, D.D.S.

Dr. Boyd was born in Troy, Ala., May 17, 1844, and was the fifth child of Alfred and Caroline Boyd. He was well educated, and in 1862 when eighteen years old he enlisted in the Confederate army at Montgomery and served in the hospital department until the close of the war.

He graduated in dentistry from the University of Tennessee, at Nashville, and in that profession he practiced scientifically until a short while since. He was the first to in-

troduce several modern methods into Alabama.

April 15, 1868, he was married to Miss Alice Thompson of Troy.

He was a city councilman of Troy about 1883, and was a member of Troy Lodge, No. 56, having been initiated May 18, 1878; passed June 3 and raised to the degree of Master Mason June 25, 1878. He was a member of the chapter, commandery, and council in Troy and was also a K. of P. He was a devoted member of the Baptist Church.

Dr. Boyd was a skilful dentist, one of the best operators in his section. He was one of the organizers of the old Southern Dental Association, also one of the organizers of the Alabama Dental Association, at Montgomery, Ala., in 1869; and since his death there are but two living survivors of those who took part in that event. Dr. Boyd was elected president of his state association for the session of 1895, about which time his health began to fail and he asked to resign his membership. This, however, the association refused to accept, and continued him upon the active list without dues. He was popular with all who knew him, and his colleagues respected him not only for his many manly qualities but for his professional skill and attainments. He was a true friend and Christian gentleman.

He is survived by his wife and six children: Dr. Thompson Boyd of Brewton, Mrs. John Starke of Geneva, and Hansford DeWitt, Jr., Joseph, Casper, and Mell Boyd.

DR. GEORGE H. CHANCE.

Died, at Portland, Oregon, September 3, 1904, of carcinoma of the rectum, George H. Chance, D.D.S., in his seventy-fifth year.

Dr. Chance was born in London, Eng., March 22, 1830. He took up the study of dentistry under a preceptor in New York city as early as 1849, and went to Oregon about 1860, where he entered upon dental practice. Later he matriculated at the Philadelphia Dental College, from which he was graduated in 1874. He was graduated also from Willamette University as M.D. about 1890.

Dr. Chance filled an important place in the history of dentistry, to the development of which he contributed much both as a practitioner and teacher and as an active participant in dental association work. As a man he was an earnest, loyal Christian gentleman, a true and helpful friend, a devoted husband and father.

He was married in 1864 to Miss Sophia Brey of Portland, Oregon. A daughter, Mrs. F. A. Kenney, and two sons, Chas. H. Chance and Dr. Arthur W. Chance, were the issue of the union. These survive him.

Dr. Chance was a member of the Oregon State Dental Society, the National Dental Association, the International Dental Congress of Paris, 1900, and the Fourth International Dental Congress, St. Louis, 1904. He took a great interest in dental legislation, having drafted and secured the passage of the first dental law of Oregon, which preceded the medical act of that state by two years.

DR. WM. C. DETWEILER.

Died, at Easton, Pa., March 22, 1905, from heart failure, Dr. Wm. C. Detweiler.

Dr. Detweiler had been a sufferer from asthma for twenty-five years, which disorder eventually brought about the difficulty which caused his death.

He was born at Kutztown, Berks county, Pa., September 2, 1831, and studied dentistry with his brother, the late Dr. I. C. Detweiler. He began the practice of his profession early in 1856, having previously taught school in some of the country districts of Berks county. During that period he was the first teacher of Dr. N. C. Schaffer, the present superintendent of public instruction in Pennsylvania.

During the past few years Dr. Detweiler practiced but little, transferring his work to the care of his son, Dr. H. L. Detweiler.

He was married October 11, 1856, to Miss Amanda Lynor, who with four children, two sons and two daughters, survive him.

DR. ELLERY C. YOUNG.

Resolutions of Respect Adopted by the American Dental Society of Europe.

The following resolutions of respect to the memory of Dr. Young were recently passed by the American Dental Society of Europe:

Whereas, It has pleased Almighty God to remove from our midst, on December 6, 1904, at the age of sixty-one, Dr. Ellery C. Young of Leipzig, court dentist to the Grand Duke of Anhalt; be it

Resolved, That the American Dental Society of Europe has sustained a serious loss in this, the death of one of its oldest members, who was respected in his community for his uprightness and sterling worth, and who was recognized by all as a superior dentist and a worthy colleague.

Resolved, That this resolution be published in the leading dental journals of the United States and a copy forwarded to the bereaved wife of our friend and colleague, and that this resolution be placed upon record as part of the proceedings of the society.

William A. Spring,
G. H. Watson,
W. Mitchell,
Committee.

GEORGE W. ELLIS, M.D.

As we are going to press with this issue the sad intelligence of the death of Dr. George W. Ellis, a former well-known dental practitioner in Philadelphia, has reached us. Dr. Ellis died in Paris, France, June 5, 1905. An extended notice will appear in our next issue.

SOCIETY NOTES AND ANNOUNCEMENTS.

DENTAL SOCIETY MEETINGS: July, August, and September, 1905.

JULY.

American Medical Association—Section on Stomatology. Portland, Oregon. Four days: July 11th to 14th.

Interstate Dental Fraternity. Buffalo, N. Y. July 24th.

Lewis and Clark Dental Congress. Portland, Oregon. Four days: July 17th to 20th.

Maine Dental Society: Portland. Three days: July 18th to 20th.

Michigan Dental Association. Detroit. Three days: July 10th to 12th.

National Association of Dental Examiners. Buffalo, N. Y. July 24th.

National Association of Dental Faculties. Buffalo, N. Y. July 27th.

National Dental Association. Buffalo, N. Y. Four days: July 25th to 28th.

New Jersey State Dental Society. Asbury Park, N. J. Four days: July 19th to 22d.

Wisconsin State Dental Society. Oshkosh. Three days: July 18th to 20th.

AUGUST.

International Dental Federation. Hanover, Ger., August 7th.

Virginia State Dental Association. Lynchburg, three days: August 2d to 4th.

SEPTEMBER.

American Society of Orthodontists. Chicago. Three days: September 28th to 30th.

Northern Indiana Dental Society. Logansport. Two days: September 19th and 20th.

Examiners' Meetings.

District of Columbia Board of Examiners. Washington. July 5th to 7th.

New Jersey Board of Registration. Trenton. July 11th to 13th.

North Dakota Board of Dental Examiners. Grand Forks. July 11th to 13th.

South Carolina Board of Dental Examiners. White Stone Springs. July 14th.

South Dakota Board of Dental Examiners. Mitchell. July 11th.

Vermont Board of Dental Examiners. Montpelier. July 5th to 7th.

"F. D. I."

INTERNATIONAL DENTAL FEDERATION.

THE President of the F. D. I. desires the announcement to be officially made that the meeting called to convene in Hanover on August 7th is not to be a general meeting, but simply a meeting of the Executive Council and of the several Commissions.

The following business will be transacted:

1. Report of the President.

2. Reports of the various national committees on recent actions taken in their respective countries in the matter of public dental hygiene and dental education.

3. Determination of the relation of the F. D. I. to the various national committees.

4. Relation of the national committees to the representative bodies of their respective countries.

5. Qualification for membership in certain cases where difference of opinion may arise.

6. The question of the advisability of publishing a pamphlet on the care of the teeth in such form as to be made accessible to the poorer classes.

7. The question of the possibility of manufacturing a tooth-brush at a price which will put it within the reach of the poorer classes. (Haderup.)

8. A discussion of the question: In what lines is the activity of the F. D. I. to be developed in the immediate future?

The Commissions thus far established by the F. D. I. are—

1. The International Commission on Education.

2. The Commission on Hygiene and Public Dental Service.

3. The Commission on the International Press.

4. The Commission on Jurisprudence and International Ethics.

To be organized: The Commission on Nomenclature.

EDWARD C. KIRK, *Secretary-general.*

NATIONAL DENTAL ASSOCIATION.

THE ninth annual session of the National Dental Association will be held in Buffalo, N. Y., July 25 to 28, 1905, inclusive.

The Hotel Iroquois has been selected by the local committee of arrangements as headquarters, where all general sessions of the Association and of the sections will be held. The clinics will be held at the rooms of the Dental Department, University of Buffalo.

Rates at the Hotel Iroquois are, single room per day $1.50, $2.00, and $2.50; rooms for two persons, $3.00 and $4.00; single rooms with bath $3.00 and $3.50; rooms with bath for two persons $5.00, $6.00, $7.00, and $7.50; all rooms on the European plan.

The usual railroad rate of one and one-third fare for the round trip, certificate plan, has been arranged for by the Executive Committee.

All pay full fare going, taking the proper certificate therefor from the ticket agent, which when properly certified at the meeting, entitles the holder to return for one-third the regular rate.

Tickets going may be purchased from July 20th to 26th, and are good returning until and including August 2d.

Both the general officers and those of the sections have been working hard to provide an interesting and instructive program, and a large attendance is expected.

A. H. PECK, *Rec. Sec'y,*
92 State st., Chicago, Ill.

Section I.

THE following program will be offered for the consideration of this section in Buffalo, July 25 to 27, 1905: Dr. Calvin S. Case, Chicago, "Orthodontia." Dr. C. Edmund Kells, New Orleans, La., "Orthodontia." Dr. V. H. Jackson, New York, "Orthodontia." Dr. R. Ottolengui, New York, "Orthodontia." Dr. H. H. Johnson, Macon, Ga., "Prosthetic Dentistry." Frederic Freeman, Boston, "Prosthetic Dentistry." Dr. W. Storer How, Philadelphia, "Some Phases of Crown and Bridge Work."

A special paper entitled "The D.D.S. Abroad," will be read by Dr. R. H. Hofheinz, Rochester, N. Y.

T. P. HINMAN, *Ch'man,* Atlanta, Ga.,
J. G. FIFE, *Sec'y,* Dallas, Tex.

Section II.

The following program will be offered for the consideration of this section in Buffalo, July 25 to 27, 1905:

J. V. Conzett, Dubuque, Ia., "Gold as a Filling Material." B. L. Thorpe, St. Louis, Mo., lantern lecture, "Pioneer Manipulators of Gold Foil." Chas. Milton Ford, New York city, "Dental Education." W. R. Clack, Clear Lake, Ia., "The Necessity for a Method of Preserving the Integrity of the Interproximal Space." Dr. D. O. M. LeCron, St. Louis, Mo., "A Few Experiments in Porcelain." Dr. D. W. Fellows, Portland, Me., "A Century of Standard Dental Writings." Dr. B. Holly Smith, Baltimore, Md., "Operative Dentistry." Dr. S. H. Guilford, Philadelphia, "The Nomenclature of Orthodontia." Wm. H. Potter, Boston, Mass., "The Use of the Summer Vacation in the Education of the Dental Student." I. J. Wetherbee, Boston, Mass., "Tin and Gold: Its Possibilities and Uses as a Filling Material."

Howard E. Roberts, *Chairman*,
Phila., Pa.,
C. S. Butler, *Sec'y*,
Buffalo, N. Y.

Section III.

In preparation for the meeting of the National Dental Association at Buffalo, N. Y., July 25 to 27, 1905, original papers and investigations are asked to be submitted upon the following topics: Oral surgery, anatomy, physiology, histology, pathology, etiology, hygiene, prophylaxis, materia medica, and allied subjects.

J. D. Patterson, *Ch'man Sect. III*,
Kansas City, Mo.

Clinic Section.

It is not possible for the secretary of the Clinic Section to do more than give the names of the clinical operators, as well as a general outline of the work which will be done at Buffalo, on July 26th and 27th, for the consideration of the members of the National Dental Association. There is not a department of dentistry which has been overlooked. Indeed, it can be said that the members of the committee have attempted to obtain the most diversified number of chair and table clinicians possible to bring together.

There will be two surgical operations of a major order. There will also be several of a minor nature, such as surgical treatment for alveolar abscess and conditions of pyorrhea.

Somnoform, narcotile, and nitrous oxid and oxygen will have their advocates present, and the use of these different agents will be fully demonstrated.

Those interested in porcelain will have a chance to see porcelain inlays made, as well as the construction of porcelain crowns and bridges. There will be any number of operations made with gold by the members of the Black Club and others. There will be operations made with amalgamated gold, amalgam, tin, etc. A number of gentlemen will also demonstrate crown and bridge operations.

There will be an extraction clinic. Table clinics.

It is out of all question to attempt an outline of the different things to be exhibited. There are upward of one hundred names on the list and it would be impossible to publish the program in detail.

There will be forty chair clinics each day.

Surgical operators: Dr. T. W. Brophy, Chicago. Dr. M. C. Smith, Lynn, Mass. These gentlemen will take care of the major surgical operations.

There are a number of others who will make the minor surgical operations. Dr. H. R. Abbott, London, Ontario: Narcotile. Dr. F. K. Ream, St. Louis, Mo.: Nitrous Oxid and Oxygen. Dr. F. R. Wagner, Watertown, N. Y., and Dr. P. M. Joyner, Union City, Tenn.: Somnoform.

Chair clinics: Dr. H. W. Arthur, Pittsburg, Pa. Dr. G. T. Baker, Boston, Mass. Dr. Wm. Conrad, St. Louis, Mo. (Will operate for dentists only.) Dr. G. W. Cochran, Erie, Pa. Dr. T. J. Coe, Baldwinsville, N. Y. Dr. L. S. Chilcott, Bangor, Me. Dr. H. W. Campbell, Suffolk. Va. Dr. Clyde Davis, Lincoln, Neb. Dr. W. B. Dunning, N. Y. Dr. Wm. St. George Elliot, N. Y. Dr. A. G. Fee, Superior. Dr. F. Freeman, Boston. Dr. S. Freeman, N. Y. Dr. F. A. Greene, Geneva, Ohio. Dr. Jos. Head, Philadelphia. Dr. E.

E. Hawley, Golden City, Mo. Dr. H. L. Howe, Boston. Dr. J. i. Hart, N. Y. Dr. V. H. Jackson, N. Y. Dr. D. O. M. LeCron, St. Louis. Dr. T. M. Milam, Little Rock, Ark. Dr. F. L. Marshall, Boston, Mass. Dr. A. L. Midgley, Providence, R. I. Dr. A. J. McDonagh, Toronto, Ont. Dr. F. W. Proseus, Rochester, N. Y. Dr. H. B. Randall, Erie, Pa. Dr. J. F. Ross, Toronto. Dr. J. A. Sherwood, Buffalo, N. Y. Dr. F. N. Stiff, Richmond, Va. Dr. C. C. Sterrett, Kingsley, Kansas. *Black Club:* Drs. A. C. Searl, Owatonna, Minn. H. J. Beemer, Newton, N. J. G. N. Beemer, Mason City. W. R. Clack, Clear Lake, Ia. J. V. Conzett, Dubuque, Ia. K. E. Carlson, St. Paul. A. C. Fawcett, Rochester, Minn. A. M. Lewis, Austin, Minn. G. D. Moyer, Montevideo, Minn. J. B. Pherrin, Central City, Ia.

Table clinics: The following have consented to give table clinics: Dr. Geo. C. Ainsworth, Boston. Dr. J. F. Adams, Toronto, Ont. Dr. F. C. Brush, N. Y. Dr. G. A. Bowers, Nashua, N. H. Dr. J. A. Brown, Morrisville, Vermont. Dr. J. Q. Byram, Indianapolis, Ind. Dr. C. F. Bunbury, Rochester, N. Y. Dr. J. H. Beebee, Rochester. Dr. N. A. Brounke, Mount Forest, Ont. Dr. G. T. Baker, Boston, Mass. Dr. R. M. Chase, Bethel, Vt. Dr. L. M. Cowardin, Richmond, Va. Dr. C. J. Evans, Baltimore, Md. Dr. F. L. Fossume, N. Y. Dr. A. C. Fawcett, Rochester, Minn. Dr. C. H. Frink, Fernandina, Fla. Dr. V. H. Frederick, St. Louis. Dr. L. M. Fay, Buffalo, N. Y. Dr. G. H. Gerrish, Exeter, N. H. Dr. A. Gaiser, Davenport, Ia. Dr. C. J. Grieves, Baltimore, Md. Dr. L. M. Homburger, N. Y. Dr. B. S. Hert, Rochester, N. Y. Dr. H. L. Howe, Boston. Dr. W. D. James, Tracy, Minn. Dr. P. M. Joyner, Union City, Tenn. Dr. J. H. Lorenz, Atlanta, Ga. Dr. Geo. A. Louque, New Orleans, La. Dr. S. C. Luckett, Joplin, Mo. Dr. W. H. Leake, Watertown, N. Y. Dr. F. W. Low, Buffalo, N. Y. Dr. C. W. LaSalle, Rochester, N. Y. Dr. F. B. Lawrence, El Dorado, Kansas. Dr. O. H. Manhard, St. Louis, Mo. Dr. G. B. Mitchell, Rochester, N. Y. Dr. F. Messerschmitt, Rochester, N. Y. Dr. Grant Mitchell, Youngstown, Ohio. Dr. A. F. Miller, Sandusky, Ohio. Dr. J. R. Mitchell, Perth, Ont. Dr. D. J. McMillen, Kansas City, Mo. Dr. Albert L. Midgley, Providence, R. I. Dr. N. J. Mummering, Milford, Mich. Dr. F. H. Nies, Brooklyn, N. Y. Dr. Alfred Owre, Minneapolis, Minn. Dr. T. W. Onderdonk, N. Y. Dr. H. M. Prettyman, Covington, Tenn. Dr. James E. Powers, Providence, R. I. Dr. S. D. Ruggles, Portsmouth, Ohio. Dr. A. C. Rich, Saratoga Springs, N. Y. Dr. A. J. Sawyer, Manchester, N. H. Dr. L. A. Smith, Port Gibson, Miss. Dr. F. R. Sandusky, Nashville, Tenn. Dr. O. H. Simpson, Dodge City, Kansas. Dr. N. A. Stanley, New Bedford, Mass. Dr. E. B. Spaulding, Detroit, Mich. Dr. A. E. Sager, Rochester, N. Y. Dr. C. A. Savage, San Francisco, Cal. Dr. L. C. Taylor, Hartford, Conn. Dr. M. C. Tracy, N. Y. Dr. J. C. Watkins, Winston-Salem, N. C. Dr. F. Westerfield, St. Charles, Mo. Dr. W. A. White, Phelps, N. Y. Dr. J. H. Worthen, Concord, N. H.

This comprises a complete list of the clinicians so far obtained. I shall not hear from the rest of the men on the committee until the 20th of June, therefore a number of names are omitted which at present are either in transit or have not been received. A number of the committee have written that they have finished their list, but so far it has not reached me. A complete program is impossible at the present time.

The clinics will be held in the College Infirmary of the University of Buffalo, Dental Department, 27 Goodrich st. The operations will begin at 9 A.M. on both Wednesday and Thursday mornings, July 26th and 27th.

As was stated in the last announcement (see June COSMOS), there is every indication that the forty chairs will have an operator at each of them on July 26th and 27th.

The thanks of the entire profession are due to the members on the committee and also to Dr. F. W. Gethro, Chicago; Dr. T. B. Hinman, Atlanta, Ga., and Dr. S. H. Voyles, St. Louis, Mo. The three gentlemen just named have rendered an excellent account of themselves in the work of assisting me toward obtaining clinicians.

E. K. WEDELSTAEDT,
Sec'y Clinic Section, N. D. A., St. Paul, Minn.

INTERSTATE DENTAL FRATERNITY.

The board of governors of the Interstate Dental Fraternity will convene for the annual business meeting of the order, in Buffalo, Monday, July 24, 1905. The annual banquet will occur during the week, and due notice thereof will be sent to the members as soon as arrangements can be made, and the exact date fixed. It is hoped that the fraternity will meet in large numbers on this occasion.

R. M. Sanger, *National Sec'y*,
East Orange, N. J.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The annual meeting of the National Association of Dental Faculties will be held in Buffalo, N. Y., commencing at 2 P.M. Thursday, July 27, 1905. The Executive Committee will meet at 10 A.M. on the same day.

Special business to come before the N. A. D. F. is the consideration of the proposed revision of the constitution and by-laws.

H. B. Tileston, *Chairman Ex. Com.*,
John I. Hart, *Sec'y Ex. Com.*,
New York, N. Y.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The annual meeting of the National Association of Dental Examiners will be held at the Iroquois Hotel, Buffalo, N. Y., beginning Monday at 10 A.M., July 24, 1905, and continuing until adjournment. The rates per day for single rooms will be $1.50, $2, and $2.50, $3 and $4 for double, and $3 and $3.50 for rooms with bath. The sessions will be held in commodious rooms in the hotel. Write early and secure your accommodations. Arrangements have already been made for members from the East for reduced excursion rates on the fast trains of the Delaware and Lackawanna Railroad, leaving New York 10 A.M., 6.10 P.M., 8.45 P.M., and 2 A.M. It is earnestly requested that the secretaries of the boards will communicate at once any changes in members' names and addresses.

Chas. A. Meeker, *Sec'y*,
29 Fulton st., Newark, N. J.

"LEWIS AND CLARK" DENTAL CONGRESS.

The program of the Lewis and Clark Dental Congress to be held in Portland, Oregon, July 17, 18, 19, and 20, indicates that the meeting will be of unusual interest.

The various committees have been working energetically each in its different line, and the local committee of arrangements has secured the Armory of the Oregon National Guard as a meeting place for the congress. In this building will be held the meetings of the American Medical Association, which holds its annual session in Portland the week preceding that of the Lewis and Clark Dental Congress. The building will be fitted up with every accommodation for clinics, exhibits, and essays, namely, electric wiring, gas, water, tables for demonstrators, chairs, electric engines, and other conveniences. The exhibit and clinic hall in this building will have an area of 20,000 square feet. The hall for business meetings and the reading of essays and discussions will seat between 1,000 and 1,500 people; is well lighted and conveniently arranged for the use of a lantern in illustrating papers.

The exhibition will open at 9 A.M. Monday, July 17th. At 10 o'clock the General Committee will convene. Norris R. Cox, chairman General Committee, will give the Salutation at 10.30, to be followed by an Address of Welcome, by Harry Lane, M.D., Mayor of Portland. Then follows the organization of the congress and election of officers. The reading of essays, discussion thereon, and the clinics will begin on the afternoon of the first day and continue till July 20th, at 5 P.M.

On the evening of the last day, July 20th, the congress adjourns to "The Trail," Lewis and Clark Fair.

Essays.

1. "Pathology." Julio Endelman, D.D.S., Philadelphia, Pa. Discussion opened by B. S. Scott, Tacoma, Wash.

2. Symposium on Empyema of the Maxillary Sinus (ten-minute papers): (*a*) "The Anatomy of the Maxillary Sinus and the Relation of the Superior Teeth to the Sinus." Dr. Jas. G. Sharp, San Francisco, Cal. (*b*) "The Etiology and Diagnosis of Empyema of the Maxillary Sinus." Dr. Frank L. Platt, San Francisco, Cal. (*c*) "The Surgical Treat-

ment of the Maxillary Sinus." Dr. John S. Marshall, U. S. Army.

3. Symposium on Fractures of the Mandible (ten-minute papers): (*a*) "The Anatomy of the Mandible, with Special Reference to the Muscles which Control its Movements and the Localities at which Fractures are Most Liable to Occur." Dr. Jas. G. Sharp, San Francisco. (*b*) "The Classification of Fractures of the Mandible and Their Diagnosis." Dr. Wm. A. Bryant, San Francisco. (*c*) "The Surgical Treatment of Fractures of the Mandible, Suturing, etc." Dr. John S. Marshall, U. S. Army. (*d*) "The Mechanical Treatment of Fractures of the Mandible. Interdental Splints, External Splints, Fracture Bands, etc." Dr. Charles H. Bowman, San Francisco.

3. "Why Are Not All Successful?" Dr. J. C. Hennessy, Reno, Nevada. Discussion opened by D. J. Wait, Helena, Mont.

4. "Mouth-Breathing: Its Relation to Orthodontia." (Eighteen lantern slides.) Ray D. Robinson, Los Angeles, Cal. Discussion opened by E. G. Howard, Los Angeles, Cal.

5. "Dental Lesions of Animals: Domestic, Captive, and Wild." (Lantern slides.) Wm. Bebb, Los Angeles, Cal. Discussion opened by Arthur D. Black, Chicago, Ill.

6. "History of Dentistry." (Lantern slides.) Burton Lee Thorpe, St. Louis, Mo. Discussion opened by Arthur W. Chance, Portland, Ore.

7. "Accidental Cleft Palates." H. J. Jaulusz, New York, N. Y. Discussion opened by J. A. Meyer, Tacoma, Wash.

8. "The Status of the Inlay: Gold and Porcelain." C. N. Thompson, Chicago, Ill. Discussion opened by B. F. Eschelman, Tacoma, Wash.

9. "Interstitial Gingivitis." Eugene S. Talbot, Chicago, Ill. Discussion opened by G. V. I. Brown, Milwaukee, Wis.

10. "Ether Spray as an Obtundent." Crittenden Van Wyck, Oakland, Cal. Discussion opened by Wm. A. Bryant, San Francisco, Cal.

11. "Dental Standards." Clyde Payne, San Francisco, Cal. Discussion opened by Wm. A. Cumming, Portland, Ore.

12. "Discrimination in the Selection of Filling Material." C. N. Johnson, Chicago, Ill. Discussion opened by John S. Marshall, San Francisco, Cal.

13. (Subject not announced.) G. V. I. Brown, Milwaukee, Wis. Discussion opened by Eugene S. Talbot, Chicago, Ill.

14. "Pulp-Technique." M. L. Rhein, New York, N. Y. Discussion opened by C. N. Johnson, Chicago, Ill.

15. "A Plea for the Left Hand." F. H. Metcalf, Sacramento, Cal. Discussion opened by S. J. Barber, Portland, Ore.

16. "The Needs of Reform in Dental Education." D. D. Smith, M.D., D.D.S., Philadelphia, Pa.

17. "Local Anesthesia" or "Dental Education." W. G. Wyckoff, Philadelphia, Pa.

18. "Diagnostic and Therapeutic Uses of X Rays in Dentistry and Oral Surgery." (With lantern slides.) M. I. Schamberg, Philadelphia, Pa.

Clinics and Clinicians.

1. M. L. Rhein, New York, N. Y. "Technic of Pulp-Removal and Root-Canal Cleansing, and Packing Gold by Means of the Electro-Magnetic Mallet."

2. Morris I. Schamberg, Philadelphia, Pa. "Root-Amputation *versus* Ablation for the Cure of Chronic Apical Abscesses."

3. C. N. Thompson, Chicago, Ill. "Gold Inlay." "Porcelain Inlays" (table clinic).

4. G. V. I. Brown, Milwaukee, Wis. Surgical clinic.

5. R. B. Gentle, New York, N. Y. "Cavity Preparation for Porcelain Inlays."

6. Alice M. Steeves, Boston, Mass. "Useful Root-Canal Filling."

7. P. M. Wuillemin, San Francisco, Cal. "Extraction Under Nitrous Oxid Anesthesia."

8. F. R. Sandusky, Nashville, Tenn. "Saddle Bridge-Work, Molars Supplied: Using All-Porcelain Dummies, with Porcelain Crowns for Anchorage."

9. R. C. Brophy, Chicago, Ill. (*a*) "Porcelain Work Without Use of Electricity." (*b*) "Metaloplastic Plate Work."

10. Ray D. Robinson, Los Angeles, Cal. "Appliances for Retaining Teeth after Shifting Occlusion."

11. J. M. Yates, Portland, Oregon. "Administration of Somnoform."

12. J. L. Pease, Oakland, Cal. (Subject to be announced.)

13. F. W. Hergert, Seattle, Wash. "Swaging Metal Plates by the Holmes-Palmer Method."

14. O. J. Fruth, St. Louis, Mo. "Raising the Bite by Means of Gold Inlays and Method of Making the Same."

15. F. L. Platt, San Francisco, Cal. "Porcelain Inlays in Crown and Bridge Work."

16. B. F. Eschelman, Tacoma, Wash. "Something Interesting to Porcelain Workers."

17. C. B. Reynolds, Seattle, Wash. "Use of Cohesive and Non-Cohesive Gold in Molars."

18. J. S. Engs, Oakland, Cal. "Photo-Micrographs."

19. J. S. Baldridge, Wooley, Wash. "The Restoration of an Incisal Angle with High-Fusing Porcelain."

20. H. J. Smith, Genessee, Idaho. "Removal of Deposits and Stains from Teeth of Adults and Children: with Medical Applications Before and After."

21. H. W. Bates, Denver, Col. "Simple Manner of Making Dies and Swaging Plates from Plaster Impressions."

22. A. M. Baker, San José, Cal. (Subject to be announced.)

23. G. W. Schwartz, Chicago, Ill. "Removable Bridges."

24. F. K. Ledyard, San José, Cal. (Subject to be announced.)

25. C. L. Rose, Fargo, N. D. "Gold Inlay."

26. J. H. Merritt, Oakland, Cal. "Restoration of Incisal Angle, Using Jenkins Porcelain."

27. A. M. Magee, Louisiana, Mo. "Some Difficult Things Presenting, and What We Will Do with Them."

28. W. V-B. Ames, Chicago, Ill. "Adaptation of Entire Artificial Dentures."

29. C. A. Southwell, Boisé, Idaho. "Filling Molar-Approximo-Mesial Cavity with Gold, Using Electric or Automatic Mallet."

30. W. F. Lawrenz, St. Louis, Mo. "Something in Porcelain."

31. C. N. Johnson, Chicago, Ill. "Demonstrations of Cavity Preparation on Models" (table clinic).

32. R. A. Rawlings, Bismarck, N. D. "Filling Disto-Occlusal Cavity in Upper Bicuspid with Gold."

33. Wm. Bebb, Los Angeles, Cal. "Anatomical Specimens" (table clinic).

34. Wm. H. DeFord, Des Moines, Iowa. "Demonstrations of Somnoform."

35. Jessie R. DeFord, Des Moines, Iowa. "Demonstrations of Somnoform."

36. C. S. Irwin, Vancouver, Wash. "Using Tin." (Table and chair clinic.)

37. E. R. Tait, Oakland, Cal. "Filling Teeth with Plastic Mat Gold."

38. J. W. Neblett, Chicago, Ill. "Showing Method of Swaging with Water. Filling Matrix with Porcelain in a Manner that will Overcome Warping."

39. V. H. Frederick, St. Louis, Mo. "Continuous-Gum Work."

40. E. B. Edgars, Seattle, Wash. "Treating Putrescent Pulp-Canals by the Use of Sodium and Potassium Compound, and Filling Immediately."

41. L. P. Haskell, Chicago, Ill. "Continuous-Gum Work."

42. A. J. Holmes, New Westminster, B. C. "Simple Method of Constructing Richmond Crown."

43. Crittenden Van Wyck, San Francisco, Cal. "Showing Van Wyck Obtunder and Practical Demonstrations with Same."

44. ———.

45. Geo. N. Wasser, Cleveland, Ohio. "High-Fusing Porcelain Inlay."

46. W. J. Hacking, New Westminster, B. C. "Technic of an Accurate Fitting and Articulated Seamless Crown."

47. H. Russell Hill, Hamilton, Mo. "Open-Face Contour Crown Work."

48. Los Angeles Porcelain Club (seven in number). Seven men will work porcelain. (A continuous clinic.)

49. W. N. Murray, Minneapolis, Minn. "Gold Inlay."

50. Valentine K. Irion, New Orleans, La. "A Full Porcelain Bridge without Use of Furnace or Baking." (The Louque system.)

51. A. P. Johnstone, Anderson, S. C. "A New and Original Way of Fitting Porcelain Crowns, Incisors, Cuspids, Bicuspids, and Molars, Upper or Lower, to Their Respective Roots" (table clinic).

52. Fred H. Metcalf, Sacramento, Cal. "Positions at the Chair for Ambidextrous Operator."

53. G. M. Osterberg, Seattle, Wash. "Adaptation of the Davis Crown by Baking."

54. G. Maurice Crow, Los Angeles, Cal. "The Use of Porcelain Stains."

55. C. F. Sweet, Minot, N. D. "Gold Fillings in Porcelain Teeth."

56. W. A. Cummings, Portland, Ore. (Subject to be announced.)

57. J. J. F. McLaughlin, North Adams, Mass. "Rowan's Extra Pliable Gold Rolls and Rolled Gold for Contour Fillings."

58. E. DeWitt R. Garden, Tarrytown, N. Y. "Mineral Plate Work."

59. J. G. Hollingsworth, Kansas City, Mo. "Demonstrating New Reinforcement for Porcelain Crowns" (table clinic).

60. Portland Porcelain Club (six).

61. D. D. Smith, Philadelphia, Pa. "Exhibition of the Correct Method of Filling Front Teeth."

62. N. R. Cox, Portland, Ore. "Somnoform Demonstrations."

63. D. I. Wadsworth, Portland, Ore. "Gold Inlay, Showing Swaging Device" (table clinic).

64. Geo. D. Peters, Portland, Ore. "Removable Crown and Bridge Work" (Peeso's method).

65. John S. Marshall, U. S. Army, Presidio, Cal. (Surgical clinic.)

66. E. A. Tripp, Salt Lake City, Utah. "Impressions of Cleft palate and Obturator."

67. Mark Hayter, Dallas, Ore. "Backing Porcelain Facings."

68. J. B. Burns, Payette, Idaho. "Practical Cases of Removable Upper Partial Plate with Attachments." "Deposits on Teeth, and Effect" (table clinic).

69. L. A. Stemmler, Myrtle Point, Ore. (*a*) "Method of Backing Facings" (table demonstration). (*b*) "Method of Placing Fillings in Porcelain Crowns."

70. J. R. Cardwell, Portland, Ore. "Trimming Model for Vacuum Plates."

71. W. N. Murray, Minneapolis, Minn. "Gold Inlay."

72. W. T. Wyckoff, Philadelphia, Pa. "Painless Extraction with Local Anesthetic."

73. E. L. Hutchinson, Honolulu, H. I. "Gold Inlay."

74. F. E. Roach, Chicago, Ill. "A New Fusible Cement."

75. J. S. Kirkwood, Salt Lake, Utah. "Extraction of Teeth and Live Pulps by Use of Somnoform."

76. Chas. W. Day, Vinita, I. T. "Invisible Attachments for Fixed or Removable Bridges."

77. Frank M. Walgamot, Portland, Ore. "Hypnotism and Its Use in Dentistry" (demonstration).

78. J. B. Entrikin, Des Moines, Iowa. "The Filling of Root-Canals with Other Than the Ordinary Chloro-Percha."

79. B. Siddall, The Dalles, Ore. "Extracting Teeth, Showing Use of Elevator."

80. W. F. Mack, Salt Lake City, Utah. "A New Idea in a Porcelain Crown."

81. D. T. Hill, Syracuse, Neb. "Dental Crown and Plate Anchor."

82. D. O. M. LeCron, St. Louis, Mo. "Porcelain and its Correct Fusing" (table clinic).

83. H. N. Smith, Seattle, Wash. "Method of Making Seam Crowns with Smith's Contour Pliers."

84. T. M. Hampton, Helena, Mont. "Gold Filling."

85. D. J. Wait, Helena, Mont. "Use of Vernon's Gold for Filling."

86. A. F. Merriman, Oakland, Cal. "Gold Filling."

87. O. D. Ireland, Portland, Ore. "Articulation of Teeth after Bonwill."

88. Dr. Stratford, New York, N. Y. "Somnoform Demonstration."

89. Lelan Otis Green, Chicago, Ill. "Painless Extraction Under Influence of the Local Anesthetic 'Acestoria.'"

90. E. W. Dodez, Ft. Wayne, Ind. "The Filling of Root-Canals with Oxpara."

91. Wm. Leon Ellerbeck, Salt Lake City, Utah. "Porcelain Furnace Construction and Porcelain Fillings."

92. Wm. Broadbent, Salt Lake City, Utah. "Carved Gums for Vulcanized Work with Papier Maché Models."

EXHIBITORS.

S. S. White Dental Manufacturing Co., Philadelphia, Pa.

Ritter Dental Mfg. Co., Rochester, N. Y.

L. D. Caulk Co., Philadelphia, Pa.

Gideon Sibley, 1214 Filbert St., Philadelphia, Pa.

Klewe & Co., Portland, Me.

Boston Pharmacal Co., San Francisco, Cal.

The J. W. Edwards Co., San Francisco, Cal.

W. V-B. Ames, 36 Washington st., Chicago, Ill.

Buffalo Dental Mfg. Co., Buffalo, N. Y.

H. D. Justi & Sons, 1301 Arch st., Philadelphia, Pa.

J. W. Ivory, 51 N. 10th st., Philadelphia, Pa.

Detroit Dental Mfg. Co., Detroit, Mich.

Dr. X. Dodal, 1307 Howard st., San Francisco, Cal.

Edward Rowan, 831-7 E. 163d st., New York, N. Y.

Dr. L. O. Green, 100 State st., Chicago, Ill.

C. H. Pinches, 1181 Broadway, New York, N. Y.

Keasby-Mattison Co., Ambler, Pa.

Hisey Dental Mfg. Co., St. Louis, Mo.

Chicago Dental Specialty Co., Chicago, Ill.

American Cabinet Co., Two Rivers, Wis.

Ransom & Randolph Co., Toledo, Ohio.

Lambert Pharmacal Co., St. Louis, Mo.

Armour & Co., Chicago, Ill.

Kress & Owen Co., Chicago, Ill.

A. P. Gould & Co., Canton, Ohio.

Dr. J. C. Graft, Newark, N. J.

Harvard Dental Mfg. Co., Canton, Ohio.

A. C. Clark & Co., 21 E. Randolph st., Chicago, Ill.

Blair Mfg. Co., Louisville, Ky.

Lee S. Smith & Son, 524 Penn ave., Pittsburg, Pa.

J. M. Ney & Co., 266 Asylum st., Hartford, Conn.

Dentists' Supply Co., 109 W. 42d st., New York, N. Y.

E. DeTrey & Son, Philadelphia, Pa.

Electro-Dental Mfg. Co., 1228 Cherry st., Philadelphia, Pa.

Cleveland Dental Mfg. Co., Cleveland, Ohio.

Horlick's Food Co., Racine, Wis.

Oakland Chemical Co., New York, N. Y.

Hall & Ruckel, New York, N. Y.

Victor Electric Co., 55-61 Market st., Chicago, Ill.

Florence Mfg. Co., Florence, Mass.

E. C. Moore & Co., 112 Miami ave., Detroit, Mich.

A. J. Watts & Co., 127 E. 23d st., New York, N. Y.

Sanitol Chemical Co., St. Louis, Mo.

Randall, Faichney & Co., Boston, Mass.

Tenax Dental Compound Co., Terre Haute, Ind.

Dentists should have their mail addressed to sub-postal station of Lewis and Clark Dental Congress, Armory Oregon National Guard, Portland, Oregon.

The social program of the Congress will be of a largely informal character. The Stomatological Club of Portland has arranged for club rooms in the Armory building, the meeting place of the Congress, where informal social gatherings will take place each day.

The Congress invites its members to participate in all the exhibitions and shows on "The Trail" of the Lewis and Clark Fair for the final entertainment following the Congress, on the night of July 20th.

Railroad and Hotel Rates.

Railroad rates will be low—$56.00 round trip from Chicago, $45.00 from the Missouri River, and less than one-half regular fare from points east of Chicago. Round-trip tickets are good for ninety days and allow choice of routes.

General Committee.

Norris R. Cox, D.D.S., *Chairman*, Abington Bldg., Portland, Oregon.

Arthur W. Chance, D.D.S., M.D., *Secretary*, 809-810 Dekum Bldg., Portland, Oregon.

The following associations are in affiliation:

Oregon.—State Dental Association. Stomatological Club.

California.—State Dental Association. Southern California Dental Association. San Francisco Dental Association. Alameda County Dental Society.

British Columbia. — British Columbia Dental Association.

Washington.—State Dental Association. Seattle Dental Club. Tacoma Dental Club. Spokane Dental Club.

Idaho.—State Dental Association.

Montana.—State Dental Association.

Utah.—State Dental Association.

Nevada.—

Committees.

Executive Committee. — Norris R. Cox, Portland, Chairman; C. S. Irwin, Vancouver, Wash.; Arthur W. Chance, Portland, Secretary; Jean Cline, Portland; E. G. Clark, Portland.

Committee on Essays.—S. J. Barber, Portland, Chairman; C. L. Goddard, San Francisco; B. F. Eschelman, Tacoma.

Committee on Clinics.—G. H. Nottage, Portland, Chairman; J. M. Meyer, Tacoma, Wash.; C. E. Post, San Francisco; A. Starke Oliver, Spokane, Wash.; Claude W. Gates, Salt Lake, Utah; J. H. Holmes, New Westminster, B. C.; A. W. Cate, Boisé, Idaho; W. H. Barth, Great Falls, Mont.; F. I. Shaw, Seattle, Wash.

Committee on Exhibits and Manufacturing Clinics.—W. F. Lewis, Portland, Chairman; Woodard, Clarke & Co., Portland; Archer & Schanz Co., Portland; John Welch Dental Depot, Portland; Oregon Dental Supply Co., Portland.

Visitors will have an opportunity to see the Lewis and Clark Exposition—the largest held in the United States for the past thirty years, excepting Chicago, 1893, and St. Louis, 1904. $30,000,000 are being expended on this exposition.

AMERICAN MEDICAL ASSOCIATION—SECTION ON STOMATOLOGY.

THE next meeting of the American Medical Association will be held in Portland, Oregon, July 11 to 14, 1905. The program for the Section on Stomatology is as follows:

1. Chairman's Address. Vida A. Latham, Chicago.

2. "The Causes and the Treatment of the Mouth-Manifestations of Certain Metabolic Disorders." Alfred C. Croftan, Chicago.

3. "The Oral Manifestations of Diabetes Mellitus." Hermann Prinz, St. Louis, Mo.

4. "The Urine and Saliva in So-called Pyorrhea Alveolaris." Wm. J. Lederer, New York city.

5. "Further Researches in the Treatment of Interstitial Gingivitis." Eugene S. Talbot, Chicago.

6. "Excretion of Toxic Products into the Mouth, with Relation to Local Infection." Fenton S. Turck, Chicago.

7. "The Relations of Dentistry to General Medicine." Samuel Hopkins, Boston, Mass.

8. "A Common Ground for Medicine and Dentistry." Frank L. Platt, San Francisco.

9. "The Physician as a Dentist." Calvin W. Knowles, San Francisco.

10. "The Physician's Duty to the Child, from a Dental Standpoint." Alice M. Steeves, Boston, Mass.

11. "Dentistry of Tomorrow." H. P. Carlton, San Francisco.

12. "What Will Probably be the Dental Educational Standard for the Coming Decade?" C. C. Chittenden, Madison, Wis.

13. "Fatal Oral Pathologic Conditions." G. V. I. Brown, Milwaukee, Wis.

14. "Surgical Bacteriology of the Mouth." A. H. Levings, Milwaukee, Wis.

15. "Surgical Aspects of Disturbed Dentition of the Third Molar." M. L. Rhein, New York city.

16. "The Treatment of Suppurative Affections of the Face and Neck Emanating from the Mouth." M. I. Schamberg, Philadelphia.

17. "The Medical Relations of Certain Conditions of the Mouth." L. Duncan Bulkley, New York city.

18. "Some Effects of Inebriety on the Teeth and Jaws." T. D. Crothers, Hartford, Conn.

19. "The Ossification of the Lower Jaw." Edward Fawcett, Bristol, Eng.

20. "Ankylostomiasis and Tongue Pigment." T. M. Russell Leonard, Grenada, B. W. I.

21. "Notes on Tooth-Genesis in Man." H. W. Marett Tims, London, England.

22. "The Etiology of Tooth-Corrugations." G. Lenox Curtis, New York city.

23. "To What Extent are Teeth Necessary to the Human Being?" M. H. Fletcher, Cincinnati, Ohio.

24. "Anesthesia by Ethyl Chlorid and Similar Agents." H. C. Miller, Portland, Oregon.

25. "The Roentgen Rays in Dentistry." M. Kassabian, Philadelphia.

The program is entirely scientific. All dentists are invited to be present and take part in the discussions. Those wishing to become members may do so by filling out blanks furnished by the Association, signed by the president and secretary of a state or local dental or medical society. Inclose five dollars, and send to the secretary of the Section on Stomatology for his signature. This also includes the *Journal of the American Medical Association* for one year.

VIDA A. LATHAM, *Chairman.*
EUGENE S. TALBOT, *Sec'y,*
103 State st., Chicago, Ill.

PACIFIC NORTHWEST ALUMNI ASSOCIATION OF THE UNIVERSITY OF PENNSYLVANIA.

THE annual reunion of the Pacific Northwest Alumni Association of the University of Pennsylvania will be held at the University Club, Portland, Oregon, Saturday evening, July 15, 1905.

All members of the association are most earnestly requested to be present, and all

visiting University of Pennsylvania graduates who expect to be in Portland at that time are cordially invited to meet with us.

CHARLES E. MCCLURE, *Sec'y.*

AMERICAN SOCIETY OF ORTHODONTISTS.

THE next meeting of the American Society of Orthodontists will be held at Chicago, September 28, 29, and 30, 1905.

ANNA HOPKINS, *Sec'y,*
St. Louis, Mo.

NEW JERSEY STATE DENTAL SOCIETY.

THE thirty-fifth annual meeting of the New Jersey State Dental Society will be held in the Auditorium, Asbury Park, N. J., commencing July 19th, and continuing until July 22d. Headquarters will be at Hotel Columbia; rates for one person in a room $3.50, two persons in room $3.00. The meeting will convene promptly at 10 A.M. on the 19th. The various committees have been successful in securing eminent practitioners for papers of present interest and some fifty clinicians in the most modern up-to-date dentistry. The space in the large Auditorium will be almost entirely filled with all the newest appliances in the practice of dentistry.

Friday evening will be devoted to the social side, with a smoker, including a collation and entertainment to the guests, exhibitors, and members.

Cut out now the week of July 17th, and meet with us. 756 dentists registered last July. Make it a thousand this year.

CHAS. A. MEEKER, *Sec'y,*
Newark, N. J.

NOTICE FROM COMMITTEE ON CLINICAL CONFERENCE.

THE society extends a special request to any member of the profession having an abnormal or difficult case to present the same before the society at the session to be held July 21, at 3 P.M.

Cases may be presented either by a clinic or before gentlemen from whom advice may be gained toward successful treatment.

It is hoped that the younger members of the profession will accept this as a special call to them, and not refrain from presenting perplexing cases which require assistance.

The chairman requests as early notice as possible of the cases to be presented.

J. G. HALSEY, *Chairman,*
Swedesboro, N. J.

MAINE DENTAL SOCIETY.

THE fortieth annual meeting of the Maine Dental Society will be held at Portland, Me., July 18, 19, and 20, 1905.

GEO. E. DOW, *Chairman Ex. Com.,*
Portland, Me.

WISCONSIN STATE DENTAL SOCIETY.

THE thirty-fifth annual meeting of the Wisconsin State Dental Society will be held at Oshkosh, Wisconsin, July 18 to 20, 1905. An excellent program of papers and clinics is being prepared by the Executive Committee. All ethical members of the profession are invited to meet with us.

W. H. MUELLER, *Sec'y,* Madison, Wis.

MICHIGAN DENTAL ASSOCIATION.

THE forty-ninth annual meeting of the Michigan Dental Association will be held at Detroit, Mich., July 10, 11, and 12, 1905. An unusually attractive program has been arranged, and the entertainment features provided by the Detroit Dental Society are to be very complete. A large attendance is anticipated.

ALBERT L. LE GRO, *Sec'y,*
Three Rivers, Mich.

KANSAS CITY DENTAL COLLEGE.

TO THE GRADUATES.

EVERY graduate of the Kansas City Dental College is requested to forward his address to the undersigned so as to complete a roster of the graduates. Do not take it for granted that your address is known.

J. P. ROOT,
Deardorff Bldg., Kansas City, Mo.

NORTHERN INDIANA DENTAL SOCIETY.

The next annual meeting of the Northern Indiana Dental Society will be held at Logansport, Ind., September 19 and 20, 1905.

Francis M. Bozer, *Sec'y*,
Logansport, Ind.

MISSOURI STATE DENTAL ASSOCIATION.

At the fortieth annual meeting of the Missouri State Dental Association, held in St. Louis, May 24 to 26, 1905, the following officers were elected: W. M. Carter, Sedalia, president; F. H. Achelphol, St. Charles, first vice-president; F. G. Worthley, Kansas City, second vice-president; H. H. Sullivan, Kansas City, recording secretary; Sam T. Bassett, St. Louis, corresponding secretary; J. T. Fry, Moberly, treasurer. Board of Censors—J. C. Pasqueth, Mexico; J. L. Bridgeford, Macon; DeCourcey Lindsley, St. Louis. Committee on Ethics—J. B. McBride, Springfield; A. J. Prosser, St. Louis; F. M. Fulkerson, Sedalia. Committee on Publication—Otto J. Fruth, St. Louis; J. W. Hull, Kansas City. Committee on Inventions and New Appliances—Ralph H. McCrum, Springfield. Committee on History of Missouri State Dental Association—Burton Lee Thorpe, St. Louis.

The next meeting will be in May 1906, at Springfield, Mo.

Sam T. Bassett, *Cor. Sec'y*,
St. Louis, Mo.

NEBRASKA STATE DENTAL SOCIETY.

The twenty-ninth annual meeting of the Nebraska State Dental Society was held in Lincoln, May 16, 17, and 18, 1905. Forty-three new members were elected.

This meeting was the best in the history of the society, with an attendance of two hundred and fifty. Sixty-three clinics were given, and twelve papers were read.

The next meeting will be held in Omaha, in May 1906.

The following officers were elected: A. Hugh Hipple, Omaha, president; E. Arthur Meservey, Kearney, vice-president; M. E. Vance, Lincoln, corresponding secretary; N. H. Morrison, Red Cloud, recording secretary; H. T. King, Freemont, treasurer. Member Board of Censors—O. L. Beeson, Beatrice.

M. E. Vance, *Corr. Sec'y*,
Lincoln, Neb.

SOUTHERN WISCONSIN DENTAL ASSOCIATION.

At the eleventh annual meeting of the Southern Wisconsin Dental Association, held at Racine, Wis., May 30 and 31, 1905, the following officers were elected: J. J. Wright, Milwaukee, president; C. F. Rodolf, Muscoda, first vice-president; J. A. Heidbrink, Union Grove, second vice-president; C. W. Collver, Clinton, secretary; W. G. Hales, Mineral Point, treasurer. Publication Committee—B. C. Campbell, Lake Geneva, J. J. Wright, Milwaukee, W. V-B. Ames, Chicago. The next meeting will be at Milwaukee.

C. W. Collver, *Sec'y*,
Clinton, Wis.

IOWA STATE DENTAL SOCIETY.

The forty-third annual meeting of the Iowa State Dental Society was held in Des Moines, Iowa, May 2, 3, and 4, 1905.

A program of unusual interest had been prepared, and the dentists of the state expressed their appreciation by attending in unusual numbers. The Des Moines dentists extended to the visiting dentists a "smoker" on Wednesday evening, which was well attended and enjoyed by all.

A special feature of the meeting was the organization of the society into "special study" clubs, the thought and plan having been worked out by Dr. J. V. Conzett, the president, and presented to the society in his opening address. Six clubs were formed, which will take up work during the year along their respective lines as follows: Inlay Club, Metal Filling Club, Crown and Bridge Club, Orthodontia Club, Prosthodontia Club, and Pathological Study Club.

The officers elected for the ensuing year are C. M. Work, Ottumwa, president; F. B. James, Wilton Junction, vice-president; C. W. Bruner, Waterloo, secretary; Mae Reynard,

Osceola, treasurer; J. B. Pherrin, Central City, superintendent of clinics. Executive Committee—W. R. Clack, J. B. Monfort and J. V. Conzett. Executive Council—Wm. Finn, R. S. Brady, J. V. Conzett, and F. M. Hunt.

C. W. Bruner, *Sec'y*,
Waterloo, Iowa.

ILLINOIS STATE DENTAL SOCIETY.

At the annual meeting of the Illinois State Dental Society, held in Moline, Ill., May 9, 10, and 11, 1905, the following officers were elected for the ensuing year: S. Finley Duncan, Joliet, president; L. W. Skidmore, Moline, vice-president; Elgin MaWhinney, 34 Washington st., Chicago, secretary; Chas. P. Pruyn, Chicago, treasurer; J. T. Cummins, Metropolis City, librarian; Edmund Noyes, Chicago, editor Transactions. Program Committee—J. P. Buckley, Chicago. Clinic Committee—W. F. Whalen, Peoria. Committee on Science and Literature—E. H. Allen, Freeport. Committee on Art and Invention—C. E. Jones, Chicago. Members of Executive Council (three years)—C. C. Corbett, Edwardsville; M. R. Harned, Rockford, and A. D. Black, Chicago. Local Committee of Arrangements—T. P. Donelan, Springfield; E. F. Hazell, Springfield, and E. A. Kartack, Springfield.

The next meeting will be held in Springfield, May 8, 9, 10, and 11, 1906.

Elgin MaWhinney, *Sec'y*,
Chicago, Ill.

VERMONT BOARD OF DENTAL EXAMINERS.

The next meeting of the Vermont Board of Dental Examiners for the examination of candidates to practice dentistry will be held at Montpelier, July 5, 6, and 7, 1905, commencing at 2 p.m. on the 5th. Headquarters will be at the Pavilion Hotel.

All applications, together with the fee of twenty-five dollars, must be in the hands of the secretary not later than June 25th. For information apply to

Geo. F. Cheney, *Sec'y*,
St. Johnsbury, Vt.

NORTH DAKOTA BOARD OF DENTAL EXAMINERS.

The North Dakota Board of Dental Examiners will hold the next examination July 11, 12, and 13, 1905, at Grand Forks, N. D. Applications should be filed with the secretary before July 12th.

H. L. Starling, *Sec'y*,
Fargo, N. D.

SOUTH CAROLINA BOARD OF DENTAL EXAMINERS.

The South Carolina Board of Dental Examiners will meet in annual session at White Stone Springs, July 14, 1905, for the purpose of examining applicants. Examinations will be both theoretical and practical. Applicants must furnish instruments, material, and patients for any demonstration called for by the board.

B. Rutledge, *Sec'y*,
Florence, S. C.

DENTAL EXAMINERS OF THE DISTRICT OF COLUMBIA.

The semi-annual examination of the Board of Dental Examiners of the District of Columbia will be held July 5, 6, and 7, 1905.

All applications for examination must be accompanied by a fee of ten dollars, and should be filed with

Sheldon G. Davis, *Sec'y*,
607 Thirteenth st., Washington, D. C.

SOUTH DAKOTA BOARD OF DENTAL EXAMINERS.

The next meeting of the South Dakota State Board of Dental Examiners will be held at Mitchell, S. D., July 11, 1905, beginning at 1.30 p.m.

All candidates will be required to perform practical work in both operative and prosthetic dentistry, and should bring all instruments and materials necessary. Vulcanizer, lathe, and swaging appliances will be furnished by the Board. Application, together with fee of ten dollars, must positively be in the hands of the secretary before July 7th.

G. W. Collins, *Sec'y*,
Vermillion, S. D.

NEW JERSEY BOARD OF REGISTRATION.

THE New Jersey State Board of Registration and Examination in Dentistry will hold its semi-annual examination in the theoretical branches in the assembly chamber of the State-house at Trenton, N. J., July 11, 12, and 13, 1905. Practical prosthetic work will be done at the office of A. Irwin, 425 Cooper st., Camden, N. J.; practical operative work at the office of Charles A. Stockton, 22 Central ave., Newark, N. J.

All applications must be in the hands of the secretary ten days prior to the examination. Fee for examination $25.00.

For information apply to

CHAS. A. MEEKER, *Sec'y*,
29 Fulton st., Newark, N. J.

ARMY DENTAL CORPS.

EXAMINING and Supervising Contract Dental Sur. John H. Hess, from duty at the Dental Base Station No. 3, Zamboanga, Mindanao, to Manila, for duty in charge of Dental Base Station No. 1, Manila. (April 18, Phil. D.)

Contract Dental Surg. Edwin P. Tignor will proceed to Calamba, Laguna, and report to the C. O. for duty. (April 11, D. Luzon.)

Contract Dental Surg. John A. McAlister, upon completion of his present duty at Fort Rosecrans, will proceed to the Presidio of San Francisco for temporary duty in the office of the Examining and Supervising Dental Surgeon at that post during the absence of Contract Dental Surg. Frank P. Stone, on leave. (May 20, D. Cal.)

DENTAL COLLEGE COMMENCEMENTS.

COLLEGE OF DENTISTRY, UNIVERSITY OF ILLINOIS.

THE fourth annual commencement exercises of the College of Dentistry, University of Illinois, were held Thursday, May 4, 1905, in Steinway Hall, Chicago, Ill. The salutatory address was delivered by Mr. James M. Thomas, the valedictory address by G. D. Ament, D.D.S., and the doctorate address by W. B. Leach, A.M., D.D.

The degree of Doctor of Dental Surgery was conferred by Edmund J. James, Ph.D., LL.D., president of the university, on the following graduates:

George Dunn Ament
Herbert Swiger Alsip
Bernard B. Autenrieth
Earl Root Bailey
Grace Baker
Walter Howard Berry
Harry Seacorn Bott
James Alfred Campbell
Leon William Clancey
John Robert Clary
Charles Edgar Comer
William Horace Crandall
John Elbert Darmer
Lee Earl Eiser
J. Joseph Flanigan
George Edwin Funston
Stephen Francis Gordon
Milton Absalom Grissom
Robert John Gunn
George Russell Houston
Kenneth Ward Houston
Robert Edgar Houston
Francis Hodge Ivey
Frand Hetherington Kelly
Norman LeRoy Kerr
Nathan Kimmel
William Aloysius Krebs
Robert William Krog
J. Byron LaDue
Harvey M. Lancaster
Edwin Arthur Lewin
Thomas Henry Logan
Arthur Garfield Lyle
William George McCall
John Francis McDonald
Charles McDowell
Elmer N. McDowell
James Edward McKahn
Jeremiah F. McSwiggin
Jay Phillips Marshall
N. Ray Mecham
Albert Mindlin
Vernon Alvin Moore
Arthur G. Nauman
Robert G. Nordgren
Clarence C. Nugent
David A Peterson
J. Chester Pogue
William Roy Porterfield
Michael James Quinlin
Roland Roderick Rains
Stonewall J. Ramsey
Paul A. Rotzoll
Theodore L. Schroeder
Harry V. Shaw
Charles M. Sherrill
F. Hayworth Smith
Irving Leland Smith
Edward William Smith
Maurice Harry Spare
George Hume Stephenson
Arthur J. Stevens
Wilhelm Ferdinand Stone
Homer Birddell Strain
James M. Thomas
Tom Waterworth
David Ignatz Weisz
Arthur DaMonte Wood
Peter Frank Wybraniec
Arthur J. H. Young

UNIVERSITY OF PENNSYLVANIA, DEPARTMENT OF DENTISTRY.

THE one hundred and forty-ninth annual commencement exercises of the University of Pennsylvania were held in the American Academy of Music, Wednesday, June 14, 1905.

The oration was delivered by Rev. Dr. George Harris.

The degree of Doctor of Dental Surgery was conferred by the provost, Chas. C. Harrison, LL.D., on the following graduates:

William J. R. Akeroyd
Percy Roy Ashplant
Benjamin F. Aumiller
Robert Austin
Charles Edgar Bain
William Adams Barker
Leland Barrett
William C. S. Barry
Henry George Baumann
Michael Smith Bennett
John Dunn Benson
Frederic Seward Blackmar
William Francis Brady
Oscar William Briner
Charles Joseph Brothers
Clifford Morse Brown
Nelson Amos Burr
Percival Arthur Burton
George Cadwell Butler
David Kenneth Campbell
William Ambrose Capell
James Henry Carey
Leon Barker Cary
Adolfo Casáres
Frank Vest Cason
Harold Chapman
John William Clay
Norman Garfield Cline
Walter Frederick Coe
Carl Sargent Coffin
Frederick W. Constien
William Gladden Cook
Jesse Frank Cooper
Stanley Moore Cordeaux
Charles Henry Cordick
Eric B. O. Cowlishaw
William Burnett Crane
Leslie Metzler Craver
Harry Nordell Darrow
Hugh M. Davidson
Charles Augustus Dennis
John Walt Dismant
Arthur F. Donahower
William Simpson Downey
Arthur Theodorus Eaton
Leslie Emerson Eaton
Albert Eberle
Wilhelm Jophus Elvers
Edward Evan-Jones
Carl Eves
Charles Agnew Ewing
Hermann Fahrländer
George Christopher Fahy
Leon Rex Felt
Whitman George Ferrin
Carlton Byford Frank
Ernst Frey
Julius Frölich
Harold Laurence Furbush
William Louis Gibb
Maurice Alan Glaspey
Thomas Henry Glynn
Walter Nathan Goldsmith
Bernard Clement Graffam
Francis Dennis Griffin
Claude Hamilton Griffith
John Carlton Grout
Henry William Hardt, Jr.
Foster Flagg Harrower
Theodore K. Hayward
Milo Hellman
Frederick William Herr
James Milton Herrington
Wallwyn Hervey
John Robert Highsmith
William Eugene Hilborn
Francis Henry Hodgson
John Coffey Hollenback
Oscar Homburger
Marcos Garcia Huidobro
Arthur Munson Hunter
Arthur Cyril Husband
Percy Durston Jones
Will Robert Jones
Charles M. Kellogg
Harold Williams Lamb
Erwin Robert Lamp
Frank Peter Layman
George Thomas Lemis
James Thomas Lillis, Jr.
Alfred Cookman Lockett
Lester David Lockwood
Brett Baxter Loomer
Robert Rensselaer Luce
James A. G. Macdonald
James Train MacDonald
Thomas F. Macdonald
James Bernard McEnany
John Francis McEnany
James Fraser McEwen
George Ernest McKeage
James Hirsh Massell
Charles Sextus Medcalf
Walter Melick
William Newton Moffett
Eric Frederick Molle
Seymour Victor Moore
Rufus Kelsay Morgan
Ira Lesgar Neill
Harold Hyde Ogden
Guy Edward O'Neil
Hubert Wesley Orr
Waldemar von Ostrowski
George Walter Peck
Henry Arthur Peterson
Walter Francis Praul
John Heil Vincent Reese
James Bernard Reckers
Ernst Reichenberger
Edward Louis Richards
Willard Huhn Richards
Arthur Samuel Sandstein
Gordon Lee Scheffer
Philip Henry Senior
John Winey Shaffer
Frank Munson Sherman
John Conrad Sippel
Samuel S. P. Smith
J. Wright Spencer
Albert Hamilton Spicer, Jr.
Charles James Spriggs
Jacob Oswin Steeley
Edward S. Stevenson
Valentine August Stoltze
Arnold H. Sutherland
Charles Cecil Sweeting
Deane Pettis Taggart
Dillard Jefferson Thomas
John Hedges Thompson
Llewellyn Tracy
John Wilbert Updegraff
Robert Jean Valette
Charles C. Voelker
Miles Delroy Wagner
Andrew R. Walker
Clarence Watland
William Charles Webb
Karl Edwards Wenk
August Westerberg
Ralph Harrison Wharen
Ernest Wright
William Stewart Ziele
Robert Zulauf

PENNSYLVANIA COLLEGE OF DENTAL SURGERY.

THE forty-ninth annual commencement exercises of the Pennsylvania College of Dental Surgery were held in the Academy of Music, Philadelphia, Pa., Thursday, June 1, 1905.

An address to the graduates was delivered by Prof. Albert P. Brubaker, M.D., D.D.S.

The degree of Doctor of Dental Surgery was conferred by I. Minis Hays, M.D., president of the college, on the following graduates:

Juan José Angulo	Costa Rica
Charles F. Assenheimer	Pennsylvania
Augusto Augusto	Italy
Francis F. Bannan	Canada
Josef Bauer	Germany
William C. T. Bauerle	Pennsylvania
Henry Holland Bell	Canada
J. Frank Bell	Pennsylvania
Louis Bernstein	Pennsylvania
George Miller Betts	New York
Solomon Blumberg	Pennsylvania
Albert Edward Brown	England
Alejandro L. y S. Cantero	Cuba
Arthur Thompson Cate	New Hampshire
Jacob L. Chalfin	Pennsylvania
J. Paul Chamberlain	Pennsylvania
John Joseph Clarke	Pennsylvania
John Freeman Coultes	Canada
Harris M. Crandall	Massachusetts
G. M. A. de Vecchis	Italy
Chas. De La C. Des Brisay	Canada
Henry Carl Dehn	New York
Abraham G. Dinenberg	Pennsylvania
Roy Earley	Pennsylvania
Laura E. Edel	Austria
George Leon Eggleston	New York
Justus H. Eigenrauch	New Jersey
Ira Orlando Felmlee	Pennsylvania
Solomon Ferdinand	New York
Israel Fischer	Pennsylvania
Samuel Allan Fischman	New Jersey
Thomas A. Fitzgerald	Massachusetts
Milton L. Freeman	Pennsylvania
Frederic C. Freemantel	England
Richard Freides	Pennsylvania
Henri Auguste Ganguillet	Switzerland
Robert Colin Good	Canada
Albert A. Goldman	New York
Johann I. Halpern	Austria
Alex. Rowan Hamilton	New Jersey
Isidor Hamberg	Pennsylvania
W. Joseph Harvey	Pennsylvania
Max Herchenröder	Germany
Michael Charles Hoade	Pennsylvania
William C. Hofmann	New Jersey
John Howard Holden	Pennsylvania
George Bancroft Irvine	Pennsylvania
John Roscoe Jones	Pennsylvania
George Venus Kalb	Pennsylvania
Edward R. Ker	New York
Bernhard Kirschenbaum	New York
Henry Kirschenbaum	New York
Arthur Wellesley Knight	Canada
Joseph Lanig	New York
Edwin T. Lownsbury	Pennsylvania
Harry Mertz Lucas	Pennsylvania
Albert James McKnight	Canada
Lyman William Marsh	Pennsylvania
Arthur Benjamin Mason	Canada
Marcel Matthey	Switzerland
Joseph Nathan Mertz	Pennsylvania
Edward Louis Metschan	Oregon
James S. Miller	Pennsylvania
J. Louis Mintz	Pennsylvania
Andrew Mitchell	Canada
Wilson Eugene Myers	Pennsylvania
Lewis Edward Newman	Pennsylvania
David Henderson Noll	Pennsylvania
Maximillian A. Rairigh	Pennsylvania
Martin I. Rasnick	Illinois
Smith Warren Reed, Jr	New York
George Edward Reiter	Pennsylvania
Harvey Mitchell Righter	Pennsylvania
V. Alvin Rightmire	New Jersey
Samuel Wesley Ritch	Connecticut
Robert Truman Roth	Pennsylvania
Isaias Quezada Saborio	Costa Rica
Floyd Clayton Sandt	Pennsylvania
Morris Schneer	New York
Frank V. Serio	Pennsylvania
Howard Houck Shepler	Pennsylvania
Marie S. S. Siebensohn	Germany
Louis M. Solomon	Pennsylvania
Peter N. Souzon	Pennsylvania
George Stimmel	Pennsylvania
Edward M. Sullivan	Pennsylvania
Fukuzo Suzuki	Japan
William S. Thompson	New York
Morford Throckmorton	Pennsylvania
Fausto y Garcia Turro	Cuba
Jacob Warshawsky	New Jersey
Elmer T. Williams	Delaware
James A. Wimbish	N. Carolina
George Wolkin	New York
Abraham M. Wolgel	New York
Raymond D. Woodford	Connecticut
Paul L. Woods	Pennsylvania
D. Lawrence Yingling	Pennsylvania

COLLEGE OF ORAL AND DENTAL SURGERY.

The annual commencement exercises of the College of Oral and Dental Surgery were held in Mendelssohn hall, New York city, Monday, May 29, 1905.

The address to the graduates was delivered by Rev. Fred. Clair Baldwin, D.D., and the valedictory by Michael James Regan, D.D.S.

The degree of Doctor of Dental Surgery was conferred by Mr. Clarkson Cowl, president of the board of trustees, on the following graduates:

Joseph Ader
Rubin Blumenthall
Maxwell Brown
Marcus Bulkowstein
Wesley Harold Cole
John Thomas Doherty
Andrew Percival Dubben
Harry Francis Dubbin
John Patrick Evans
Harry Fishman
Albert Eugene Forshay
Anna G. Freedman
Harold Rayford Fry
Rosamond German
William Goetz
George Albert Gortikov
Julius Gutman
Edwin Clifton Hall
William Janson, Jr.
Joseph Josephson
Elizabeth C. Kalisher
Eva Katzman
Chas. Kopalov
Samuel Lifshultz
Joseph Lock
Bertram B. Machat
Margaret L. McMahon
Clarence Mayer
Frederick H. Mensching
Harry Mishnun
Isidore Moscovitz
Richard Muller
James Frederic Pye
Hattie W. Quackenbush
Michael James Regan
Isadore F. Relkin
Justus Eugene Requa
Louis Rokeach
Jacob Rolnick
Isidore Russianoff
Elise S. Satinover
Walter M. Scott
Bernard Francis Shea
David Short
Louis Shnayerson
Samuel Shnayerson
David M. Siser
Percy C. Spengeman
Rose J. Stavisker
Philip Steigman
William James Tappen
Maurice John Ureles
William D. Wehrenberg
David W. B. Wilson

GEORGE WASHINGTON UNIVERSITY, DEPARTMENT OF DENTISTRY.

The annual commencement exercises of the Department of Dentistry, George Washington University, were held in Memorial Continental Hall, Washington, D. C., May 29, 1905.

An address was delivered by Prof. Charles E. Munroe, Ph.D.

The degree of Doctor of Dental Surgery was conferred by the president, Chas. W. Needham, LL.D., on the following graduates:

Charles De Warren Ake..	Pennsylvania
Lewis Miller Bartlett....	Massachusetts
Adelbert Maurice Bassford	Illinois
Mark Carleton Bullis....	Michigan
William Earle Butler....	West Virginia
George Samuel Catts.....	Dist. of Columbia
Thomas Maslin Chunn...	North Carolina
Seth Eugene Cole.....	Vermont
Claude Bonifant Cooksey.	Dist. of Columbia
Angel Custodio Cortes....	Porto Rico
Ralph Webster De Mass..	Michigan
George Andrew Fletcher..	New York
William Edwin Francis...	Dist. of Columbia
Robert Wellington Lowe..	Massachusetts
Fred De Witt Maphis....	Virginia
Leighton Van B. Marschalk	Florida
Fred Arthur Mitchell....	Texas
Charles Brown Noble.....	Dist. of Columbia
Joseph Wood Pollock....	Indiana
Walter Edwin Rogers....	Texas
John C. R. Schumacher...	Missouri
Thomas R. Wilkerson....	Virginia
Joseph Henry Wood.....	Dist. of Columbia

NORTHWESTERN UNIVERSITY DENTAL SCHOOL.

The annual commencement exercises of the Northwestern University Dental School were held Thursday, May 4, 1905, at the Garrick Theater, Chicago, Ill.

The doctorate address was delivered by Rev. William A. Quayle.

The degree of Doctor of Dental Surgery was conferred by Thomas F. Holgate, acting president of the university, on the following graduates:

John August Adamson
Samuel Arthur Allen
George Benoni Amiot
Clayton Lyman Beach
John Willis Beardslee
Robert Stewart Bettis
Edwin John Blass
Albert H. A. Blome
John Hamilton Bowe
L. Roy Bower
Charles Barker Boyington
Clarence Edwin Briggs
Edgar Hall Briscoe
Roscoe Bristow
Jesse Lyman Bronson
Hilles Talley Brown
Leonard Granville Brown
Clarence Roy Buckley
Frank Donald Burns
Walter Rainey Carrington
Carlos Leonardo Cassell
Owen Elmer Cassill
Claude Cecil Chadwick
Robert Lane Clark
Robert R. Clendenen
Winfield Horace Colby
Joseph Hickman Collins
Bishop Albert Conklin
Alice Corey
Scott Covalt
Roy Morton Crouse
Everett Lodowick Crume
John James Curran
James William Daly
David Hill Danek
Ernst J. H. Diffenbacher
Roy Vance Dillingham
Frank Leslie Dixon
Mabel Dixon
John Joseph Donovan
Joseph Murray Downey
Harold W. W. Duffel
Chester Silas Dunkle
Loren Starke Eastman
Carson Elwood Ellis
John McDonald Eveleth
Herbert Macon Fay
Albert Frederick Fellman
William Frederick Fiebig
Willard Harry Fox
Frederick Sanderson Fritz
John Joseph Gatons
Will Warren Gibson
Percy Osborne Giles
Thomas Edward Gilmore
H. LeRoy Gowdy
James Clinton Grant
Frederick George Gurley
Henry Howard Hamman
Alfred James Harper
Arthur Otto Haury
Oscar Edward Heins
C. A. Hendrickson, D.V.M.
Francis Marion Higby
Carl Asa Hickley
Elmer Hugo Hollem
Warren Kendall Hull
Leonard E. Hutchinson
William Wallace Irwin
Bertram Jackson
Edward Watkins James
Raleigh Arthur Jennings
Ole Jorgen Jensen
Albert Nellon Johnson
Harvey Vilelle Jones
Joseph Rodney Kagy
David Kallander
Rebecca Kallner
Abraham Harry Kalman
William Thomas Kane
Christian Wilhelm Keppler
Kent Kerch
Frederick Cassius Knecht
William Kocher
Walter William Kohler
Emil Frederich Kriebel
Forrest P. LaBounta
Arthur Charles Lafount
Hugo Charles Lambach
Jesse Pitzer Lane
William Francis Larkin
David Garnet Leckie
Gilbert O. Lee
Elmer Richard Leverton
Olaf Lohnbakken
Andrew V. Louderback, M.S.
George Geoffrey Lowes
Hallett Emmett Lowry
George Benj. Luetscher
Leslie Arthur Lupton
Leonard Milton Maas
George C. McCann
Archibald L. McCulloch
Thomas H. McCulloch
Harry LeRoy McDonald
Philip Frederick Macdonald
Thomas Henry McGovern
Vincent Alexis McGuigan
Daniel Herbert McKechney
Archibald Angus McRae
William James Mahaffy
Harry Orlady Mailer
Louis Ernest Malkin
LeRoy B. Manchester
William Tanner Mann
Clarence Lee Mason
George Henry Maxwell
Ora Levertia Medsker
William Gardner Meek
Frank Cary Mendenhall
Milfred Isaac Merritt
John B. Miller
Rolin Virgil Mills
William James Moe
Ernest Bedford Monteith
Francis A. B. Moore
Virgil Moore
William Garnet Moore
John Francis Morrison
William Wallace Muir
Artemas Ward Murphy
William Lindley Myer
William Garfield Mylroie
George Albin Nelson, Jr.
John Joseph O'Connell
Matthew Martin O'Hara
Olaf J. Olafsson
John W. Parker, B. S.
James Franklin Parks
Karl B. Paschal
John Wenzel Peroutky
Ava Carl Persinger
Edgar Burns Phelps
Lee Albert Phillips
William Henry Plaxton
Perry Haskell Plummer
Harley Jay Porter
Helen Kerns Porter
Oscar Charles Prideaux
William Glenn Redmond
Henry John Andrew Renno
Thomas L. Rice, D.V.M.
Daniel Howard Riley
Harbin Septer Riley
Ira Henry Risinger
Milo Charles Roberts
William Roy Samson
William Enoch Sargent
Frank Lyman Sawyers
Ferdinand H. Scharff
Edward J. Schnaidt
Robert Morris Scovel
Leigh Watts Sherman
George Earl Siverling
Frank William Small
Charles Edgar Smith
Harold Slayton Smith
Harry Oscar Smith
David MacCoil Somerville
Joseph Edward Soukup
Harry Albert Sprague
Walter Stark
Nels Ludwig Stenberg
William Henry Stenz
William Curtis Stewart
Henry Symes Stimson
Melvin Menroe Stiner
Charles Abraham Street
Earl Glenn Swain
George Wesley Taylor
August Hubert Teitgen
Garrett Henry Tellman
Rees Lewis Thomas
Gilbert C. Thorsness
Teel Dow Traveller
John Trythall
Charles Malcolm Uglow
Elmer C. Unbehaun
Theodore Howard Unland
Otto Christian Uttech
Leo Andrew Viersen
Thomas John Walsh
Harvey Benson Washburn
Clarence Kinne Weaver
Charles Joseph Webster
Robert Andrew Weir
Rolland DeWitt Wesley
Arthur West
Frederick Victor West
Carl Edward Whiting
Holland Ernest Wight
Thomas Earl Williams
Clarke Mills Willson
Charles R. Woodworth
Walter John Wriglesworth
Mattie Karn Wyman
Edward Wilson Yackel

PHILADELPHIA DENTAL COLLEGE.

THE forty-second annual commencement exercises of the Philadelphia Dental College were held in the Academy of Music, Philadelphia, Pa., Friday, June 2, 1905.

An address to the graduates was delivered by Thos. C. Stellwagen, M.A., M.D., D.D.S., and the valedictory address was given by John M. O'Connell, D.D.S.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

William Steen Anderson	Pennsylvania
Frank F. Bent	Canada
A. Leo Blaisdell	New Jersey
Norman Garfield Bowkley	Pennsylvania
Clifton R. Chamberlain	Connecticut
Cecil Charlton	Australia
Earl E. Chestnutt	Pennsylvania
James Edward Condren	New York
Charles C. Coomes	New York
Rose Coxon	New York
Armando Crucet	Cuba
A. Ross Currie	New Brunswick
William Edmund Dale	Pennsylvania
Leon Elmer Dary	Connecticut
Elmore D. Dier	Canada
Thomas A. Doyle	Massachusetts
Daniel Milton Driver	New York
Joseph Parker Ekings	New Jersey
Fred. Joseph Farrington	New Jersey
William J. Gardner	Pennsylvania
David M. Garibian	Armenia
Edward J. Gibbs	Connecticut
Gustav Adolf Giger	New Jersey
Z. D. Gimush Gairdan	Armenia
Clarence Goette, B.S	Louisiana
Rudolph E. Gordon	St. Thomas
Charles R. Grissinger	Pennsylvania
Aloysius J. Groves	New Jersey
Harry Homer Haas	Alabama
Magur Hagopian, Ph.G	Armenia
John Alfred Hall	Vermont
Reu A. Hand	New Jersey
Arthur Cecil Hanson	Australia
Frank C. Harwood	Canada
Cornelius Gerald Hazen	Michigan
Thorington Heard	Canada
Wade M. Henderson	Pennsylvania
Le Roy Norwood Hengst	Pennsylvania
M. Joseph Henry	Pennsylvania
Hardress E. Hiltz	Nova Scotia
Frank R. Holmes	Maine
Charles J. Howlett	Newfoundland
Harry A. Houghton	Connecticut
Stephen J. Houk	New York
Harry C. Jackson	New York
John B. Johnson	New Jersey
Joseph A. Jones	New Jersey
Frank E. Judson	Connecticut
William Julian	New York
Edwin H. Kahler	Pennsylvania
Henry B. Kingman	China
A. Leland Kniffin	New Jersey
Herman Lehrman	New York
Hugh Leitch	Canada
Jacob Levy	Pennsylvania
George W. Lewis	Pennsylvania
Henry Linstead	Connecticut
Harry Houtz Long	Pennsylvania
John H. Longnecker	New York
Cornelius J. Lynch	Massachusetts
James J. Maginnis	Pennsylvania
George E. Matt	New York
James E. Mayer	West Virginia
Julius C. Merle	New York
Homer Brown Millen	Canada
Melville R. Milne, B.A	Ontario
Francis M. Mone	New York
George Robert Moon	New York
Jay E. Musselman	Washington, D. C.
Alexander McClellan	New York
T. Francis McManus	New Jersey
Emerson McNeill	Canada
Edward S. McNevin	Pennsylvania
Charles B. McNulty	New York
James W. McPhillips	Pennsylvania
William Henry Nitzschke	New York
John M. O'Connell	Rhode Island
Walker Coates Pennock	Pennsylvania
Robert H. Perry	Maine
Philibert J. Phillips	Vermont
Robert Greenless Pratt	New York
John T. Pullen	Canada
Alfred Swaine Randell	Australia
Morris Ratner	New York
Howard M. Reid	Canada
Frans Johan Roth, Ph.G	Sweden
Walter Wray Rumberger	Pennsylvania
Frederick A. Russell	New York
Harry W. Sancton	New York
Frederick Kane Sawyer	Maine
Ernest A. Schwabe	Australia
Frederick A. Scott	Connecticut
Gregory F. Scott	Pennsylvania
Robert W. Scott	Canada
John J. Shea	Massachusetts
Edward A. Sheehy	New York
Fred P. Slattery	Massachusetts
Charles H. Smith	Canada
Herbert Richard Smith	Pennsylvania
Shirl H. Spaulding	Vermont
Daniel J. Steiner	Pennsylvania
Edwin J. Strance	Pennsylvania
Jerry W. Sullivan	Massachusetts
Parsegh G. Terzian	New York
Norman L. Tuxbury	Massachusetts
Charles E. Van Wickle	New Jersey
Jay T. Wallace	New York
L. Chester Watson	Pennsylvania
Walter J. Webster	Jamaica
Ida Eva Weiner	New Jersey
Edgar Richard White	New York
James Alva Younie	Pennsylvania
Herbert L. Ziele	New Zealand

NEW YORK COLLEGE OF DENTISTRY.

THE thirty-ninth annual commencement exercises of the New York College of Dentistry were held in Carnegie Hall, New York city, Monday, June 5, 1905.

The address to the graduates was delivered by Rev. Thomas R. Slicer, D.D., and the valedictory by David Wield McLean, D.D.S.

The degree of Doctor of Dental Surgery was conferred by Rev. George Alexander, D.D., president of the board of trustees and directors, on the following graduates:

Emilo M. Agostini y Godoy
Luis Agostini y Godoy
*Theodore Harvest Albright
Armen D. Anderson, A.B.
Gustav Herman Areskog
*Louis Baum
*Arthur Nathan Bauman
Samuel Saul Beck, B.S.
Aaron Bernstein, B.S.
*Bernard Bernstein
Maurice Marcus Bluhm
Samuel Sidney Blum
Abraham S. Brownstein
Oscar Jerome Chase, Jr.
Charles Chess
Arcadie Carr
*Samuel Barrett Cooper
George Ray Daly
Samuel Davidson
Issac Dennison
Alfred James DeVille
Harry Herman Ducker
Timothy J. Faughnan
Alfred Fergess
Samuel Irving Freeman
David B. Freundlich
Maurice Fried
Solomon Louis Friedland
Lewis Charles Gabler
George Joseph Gerstenfeld
Ernest Gluck
Herman Glückman
Harry Alex. Goldberg
Charles August Gomer
Jonas S. Greenberg
Robert Wolf Greenberg
Max Greenwald
Benjamin Greif
*August Grosch
Max Harrowich
Edwin Coon Haslehurst
Ferdinand Heene, Jr.
Simon Helfman
Max Heller
Max Herbst
*Herman Hirschman
William John Hoag
Maxwell Samuel Joffe
Max Kamenetzky
Barnet David Kantrowitz
John Leonidas Kaufman
*Earl Krows
*Abraham Kupperman
*Robert Lamkay
Samuel Alex. Lando
Clive William Lanphere
Benjamin Fenton Levene
Louis Levitt
Isaac Magee
David Anson Maretsky
*Max Maschke
David Wield McLean
*Leopold Michnoff
Arthur Miller
Thomas Herman Monroe
Joseph Harris Mullman
Erich R. J. Munde
*James Aloysius Murray
Harry Nathan
*Samuel Jerome Neuman
Samuel J. Oberwager
Morrell Sleight O'Connell
Julius Orwan
John Robert Osborn
Roger O'Sullivan
William Francis Perpente
Edward Daniel Pollock
*Benjamin Pomerantz
Isadore Abraham Press
Michael D. Rachlin, Ph.G.
Louis Moses Robins
Harry William Rosalsky
Harry Rosen
William Rosenbaum
*Adolph I. Schoenholtz
Meyer Schwartz
Charles Scudder
Gustav L. E. Seidel
Clarence Irwing Simpson
Charles Ellery Smith
Dwight Lockwood Smith
Herman Spitz
Maurice Friend Sprinz
Elias Theodore Sternfield
Milton Aaron Strauss
William Nicholas Sum
*William Henry Taylor
Henry Trattner
Henry Urban
Clarence M. Van De Water
Jules Auguste Vuilleumier
Harry Jacob Wahrman
George Graham Weinstein
Jacob Benjamin Zeigler

MEHARRY DENTAL COLLEGE.

THE annual commencement exercises of the Meharry Dental College (Walden University) were held February 28, 1905, in the Meharry Auditorium, Nashville, Tenn.

The valedictory was delivered by W. E. Rainwater.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

R. H. D. Bascomb	Bermuda
G. P. Bell	Tennessee
I. H. Burney	Georgia
J. A. Harper	Georgia
J. M. Henry	Georgia
J. W. Jamerson	Virginia
Sylvester Jefferson	Georgia
H. H. Kennedy	Tennessee
J. W. Morrison	Mississippi
W. E. Rainwater	Georgia
W. F. Watkins	Alabama
R. B. Woodson	Tennessee
J. A. Wright	Jamaica

* Curriculum requirements completed, but diploma witheld until legal requirements are fulfilled, when degrees will be conferred at the following meeting of the trustees and directors.

OHIO COLLEGE OF DENTAL SURGERY.

The fifty-ninth annual commencement exercises of the Ohio College of Dental Surgery (Department of Dentistry, University of Cincinnati) were held at the Odeon, Cincinnati, Ohio, May 11, 1905.

Addresses were delivered by Rev. Robert Watson, D.D., and Wm. S. Hoffman.

The degree of Doctor of Dental Surgery was conferred by Hon. Herbert Jenney, president of the board of trustees, on the following graduates:

Charles A. Allen	California
Arthur H. Belt	California
William G. Best	Massachusetts
Arthur E. Bible	Indiana
Arthur S. Blake	Ohio
Joseph R. Bowen	Ohio
Francis O. Boston	Ohio
Frederick R. Brown	Michigan
John F. Browne	Ohio
Eugene O. Buchanan	Ohio
Wilburn W. Burdette	West Virginia
Carl W. Burns	Ohio
Frank J. Bussey	Ohio
David E. Carey	Ohio
Harley M. Carey	Ohio
Charles A. Cavagna	Ohio
George W. Dancer	Indiana
Mrs. Cora B. Davies	Ohio
Allan A. Davis	Ohio
Oscar D. Donaldson	Ohio
Paul P. Eshman	Ohio
Hugh S. Espey	Indiana
Calvin P. Fenner	Ohio
Victor W. Foster	Montana
Harry C. Graham	Ohio
John J. Griffith	Illinois
Mrs. Flora N. Haag	Ohio
Simeon F. Hamilton	Kentucky
Ottie O. Harper	Kentucky
Holmes G. Harshbarger	Ohio
E. Leroy Henes	Ohio
Gay L. Hitler	Ohio
William S. Hoffman	Ohio
Leonard P. Huddleston	Kentucky
Frank H. Huff	Pennsylvania
Harvey C. Huffman	Ohio
John M. Hurlburt	Ohio
Clark P. Jenner	Illinois
Marion G. Kline	Ohio
Frank J. Knoll, Jr	Kentucky
Ackison E. Lincicome	West Virginia
Gilbert C. Littleton	Ohio
Henry F. Majoewsky	Ohio
Harry Miller	Ohio
Otto M. Morrell	Ohio
James E. E. Morrison	Ohio
Will Mount	West Virginia
Charles A. Musgrave	Ohio
James A. Neill	Indiana
H. Clay Osborne	West Virginia
John E. Potts	Ohio
Thomas K. Province	Texas
Sterling P. Quisenberry	Kentucky
Herbert C. Rice	Illinois
Warren E. Robinson	Indiana
William H. Rockwell	Ohio
Roy S. Rogers	Ohio
Edgar D. Rush	Ohio
Charles A. Schaaf	Ohio
Starling M. Scott	Ohio
Samuel F. Shakely	Pennsylvania.
John A. Sites	Ohio
Horace H. Smallridge	West Virginia
William Guy Smith	Ohio
Victor S. Taylor	Ohio
Edward V. M. Thompson	Ohio
Edwin B. Tizzard	Ohio
Otto J. Towers	Ohio
L. Vaughn Voorhees	Ohio
William G. Wallace	Ohio
Walter W. Watts	West Virginia
Ira M. Williams	Kentucky
Pleasant H. Williams	Kentucky
Hector B. Wilson	New York
Clarence E. Wisecup	Missouri
George A. Withrow	Indiana
Charles DeMott Wright	Ohio

BALTIMORE MEDICAL COLLEGE, DENTAL DEPARTMENT.

The tenth annual commencement exercises of the Dental Department of Baltimore Medical College were held at the Lyceum Theater, Baltimore, Md., May 11, 1905.

An address was delivered by Rev. Donald Guthrie, D.D.

The degree of Doctor of Dental Surgery was conferred by the dean, Prof. S. K. Merrick, president of the board of directors, on the following graduates:

James Floyd Argabright	Maryland
Oscar Suter Benson	Maryland
James Edward Connolly	Maryland
Harry Ross Coppage	Maryland
Clarence Joseph Dennen	New York
Edward S. Ellard	Massachusetts
Lester Chester Empie	New York
William Allen Etheridge	Maryland
John Robertson Finch	New York
James Ambrose Fulmer	South Carolina
John Landrum Geer	North Carolina
Conrad Gold	Maryland
Arthur Edward Guildford	Connecticut
John Stephen Hebb, Jr.	Maryland
Joseph Armstrong Jones	Maryland
John Joseph Keef	Massachusetts
Thomas Joseph Kenney	Massachusetts
Charles S. H. Lazowski	Connecticut
Jean-Baptiste Leonard	Massachusetts
Winfield S. H. Martin	New Jersey
Felix William Miller	Massachusetts
William Joseph Murphy	Massachusetts
Edward Francis O'Brien	Connecticut
John Joseph O'Connor	Massachusetts
Richard Henry Reynolds	Massachusetts
William Huntley Richardson	Michigan
William Spiller Rosenheim	Virginia
Harry Everett Rowan	Pennsylvania
Ora Leroy Smith	New Hampshire
Conrad C. E. Tessier	Massachusetts

WESTERN DENTAL COLLEGE.

THE annual commencement exercises of the Western Dental College were held in the Central High School Auditorium, Kansas City, Mo., Saturday, May 6, 1905.

The annual address was delivered by Matt. S. Hughes, D.D.

The degree of Doctor of Dental Surgery was conferred by the dean, D. J. McMillen, M.D., D.D.S., on the following graduates:

John J. Allen
Cyrus N. Allison
Edward Marvin Atkinson
Paul V. Baker
Rollin Lester Beale
John M. Beshoar
John Harold Billings
Emmett Horn Bostel
Halley Brockett
Thomas Claude Brown
Irvy Brown
Tom K. Campbell
John M. Coe
Carson Edgar Davis
John D. Eckes
Emmett Foster Elliott
Herman A. Francke
J. Bruce French
Otis Tell Gaston
Fletcher C. Gale
Joseph H. Grant, Jr.
Ernest F. Greer
Lee Foy Griggs
Carlton H. Hammond
John D. Hancock
Oscar K. Hansen
Charles C. Haworth
George J. Herrin
Charles L. Hoge
Louis R. Hough
Jacob Elmer Huff
Roe R. Humphrey
Harry W. Hutchinson
Alfred Frazer Kennedy
James Herbert Kittredge
Fritz E. Kreyer
Harry C. Kyger
I. M. Lightner
Shaw Little
Charles M. Lukens
Oren H. McCarty
George Merrick
William Joseph Miller
David Ross Moore
George Forney Moseley
Leonard G. Pantier
Fred H. Phillips
Victor O. Pranter
John A. Sawhill
Edward W. Searfoss
Arthur H. Schroeder
Christian Perry Scrivener
Fred E. Sims
Ralph E. Spencer
James Arthur Spicer
Wilder I. Strawn
John Allen Talbot
Alphia Earnest Tipton
Willie Mitchell Young

MEDICO-CHIRURGICAL COLLEGE, DENTAL DEPARTMENT.

THE annual commencement exercises of the Dental Department of the Medico-Chirurgical College were held May 27, 1905, in the Academy of Music, Philadelphia, Pa.

The doctorate address was delivered by Judge William N. Ashman.

The degree of Doctor of Dental Surgery was conferred by the president, Henry F. Walton, on the following graduates:

J. Edmund Bronson	Pennsylvania
Cecil C. Cunningham	Canada
Samuel Bruce Fleming	Pennsylvania
J. Edward Gallico	New York
John Joseph Gormley	Massachusetts
Fred T. Haberstick	New Jersey
Joseph Houlton	Maine
Albert Charles Kunkle	Pennsylvania
Roscoe Conkling Lewis	Pennsylvania
Herbert Quincy Mariner	Maine
Leon Martin	Pennsylvania
Lyle Henderson Rickards	Pennsylvania
John Frederick Schoenberger	Pennsylvania
Henry A. Wettstein	Pennsylvania
D. Anton Zurbrigg	Canada

UNIVERSITY OF MINNESOTA, COLLEGE OF DENTISTRY.

THE annual commencement exercises of the College of Dentistry, University of Minnesota, were held June 1, 1905, at the University Armory, Minneapolis, Minn.

An address was delivered by Hon. Knute Nelson.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Henry W. Baker	Minnesota	William Kubat	Minnesota
Merton Eugene Bancroft	Wisconsin	Thomas Irving LaDue	Minnesota
Harry Elijah Barton	Michigan	Joseph Lukkason	Minnesota
Charles Edward Bennett	Minnesota	Harry David Lyon	Minnesota
Arthur Hugo Bittner	Minnesota	Herman Albert Maves	Minnesota
Edward Borgendale	Minnesota	Ralph Emerson McIntyre	Wisconsin
John Francis Bowe	Minnesota	Charles Warren Miller	Minnesota
Olaf William Brastad	Minnesota	M. A. Moran	Minnesota
Thomas Andrew Brown	Minnesota	Gilbert Moskau	N. Dakota
Frederick Preston Burgan	Minnesota	Charles Nelson	Minnesota
Leonard Henry Burt	Minnesota	Elof Nelson	Minnesota
Alvin Eugene Carr	Minnesota	Harry Clarence Newgord	Minnesota
Don Casselman	Minnesota	Harold Ferdinand Porter	Minnesota
Walter Hartley Corson	Minnesota	Charles A. Putney	Minnesota
James Curtin	Minnesota	Henry William Remele	Minnesota
Joseph William Deering	Wisconsin	Joseph Frederick Shellman	Minnesota
Milo Hayden Doyle	Minnesota	Forest Edward Staples	Minnesota
Charles White Foster	Minnesota	Cassius Clinton Strang	Minnesota
Clarence Gifford Gillam	Minnesota	Eugene S. Sweeney	Minnesota
Chauncy Wilford Hamlon	Minnesota	William Knox Taylor	Minnesota
Henry Alexander Hanson	Minnesota	William Vandersaal	Pennsylvania
Edward Anthony Ihle	Wisconsin	Robert Wallace	Minnesota
Raymond Eugene Ingalls	Minnesota	Frank Denton White	Minnesota
Alfred C. Johnson	Minnesota	Everett LeRoy Youngberg	Minnesota

DETROIT COLLEGE OF MEDICINE, DENTAL DEPARTMENT.

THE annual commencement exercises of the Dental Department of the Detroit College of Medicine were held at Harmonie Hall, Thursday, June 8, 1905.

An address was delivered by Rev. John Munday, and the valedictorian was C. W. Colter.

The degree of Doctor of Dental Surgery was conferred by the president, Sidney T. Miller, on the following graduates:

L. G. Fenner	W. G. McNabb	H. H. Powers	P. Wicks
W. W. Fleming	E. J. Monaghan	J. M. Rainey	W. Woodbridge
A. H. Heim	P. J. O'Reilly, M.D.	F. D. Stevenson	E. L. Yale
J. C. Labadie	M. Pringle	C. L. Watt	

GEORGETOWN UNIVERSITY, DENTAL DEPARTMENT.

THE annual commencement exercises of the Dental Department of Georgetown University were held Tuesday, June 13, 1905, in Georgetown College, Washington, D. C.

An address to the graduates was delivered by Prof. Edward L. Keyes, Jr., Ph.D., M.D., and the valedictorian was Paul B. A. Johnson, M.D.

The degree of Doctor of Dental Surgery was conferred by the president, Rev. Jerome Daugherty, S.J., on the following graduates:

James H. Hart	Massachusetts	Richard F. McDonald	New Hampshire
Saul Sidney Jaffe	Russia	Frederick C. Perry	Dist. of Columbia
Otto Frederick Kuehn	Indiana		

ST. LOUIS DENTAL COLLEGE.

THE annual commencement exercises of the St. Louis Dental College (formerly Marion-Sims Dental College) were held on Saturday evening, May 6, 1905, in the Y. M. C. A. Hall.

An eloquent address was delivered to the graduates by Dr. James W. Lee.

The degree of Doctor of Dental Surgery was conferred by the dean, M. C. Marshall, D.D.S., on the following graduates:

John Newton Barbee	Missouri
Ernest Fred Becker	Texas
Henry Paul Bockrath	Missouri
Ernest Fred Boewe	Illinois
James Larkin Borah	Illinois
Beverly Ehrman Broaddus	Missouri
Tilmon Howard Bryant	Texas
James Cornelius Burgess	Missouri
Thomas Raymond Burk	Texas
Legrand Knapp Charles	Illinois
Guy Canterbury	Washington
Fennel Moutry Cole	Missouri
John Elihu Combe	Illinois
Marvin Browning Combs	Texas
Harry Roger Dahman	Illinois
Francis Marion Dean	Washington
Oscar Thomas Dean	Washington
George B. Donalson	Texas
Edward Arthur Dulitz	Iowa
William Ernst	Missouri
Philip Finot	Missouri
John Edward Frech, Jr	Missouri
William Charles Freivogel	Illinois
Oliver Godshall	Iowa
Gustave Adolf Graefe	Germany
Willie Brom Henderson	Texas
Ernest L. G. Heyne	Illinois
Albert Roy Hofer	West Virginia
Solomon Kampe	Missouri
Frederick John Kayler	Washington
Harry Clyde Kitchell	Missouri
Edward F. Koll	Germany
John Riley Lee	Missouri
Marvin Cope Lee	Missouri
Roy Hull McCormack	Missouri
Alpheus Guy MaGee	Missouri
William Andrew McKee	Illinois
Samuel Thomas McMillin	Missouri
Joseph Henderson Maxwell	Illinois
Henry Edward Menkhaus	Missouri
William Jacob Miller	Missouri
Frank Xavier John Orlick	Missouri
Joseph Pius Pecau	Missouri
Arnold Popp	Missouri
Leo Carlos Pitkin	Missouri
Julius Radomsky, Jr.	Missouri
Glendenning Allan Ralston	North Dakota
Charles Rederer	Missouri
Harry Walter Reinhardt	Missouri
John Allen Robinson	Missouri
Bert Clark Roper	Tennessee
William Gottlieb Ruckenbrod	Iowa
Doddridge Fielding Sadler	Missouri
Gabriel Mosses Saliba	Syria
William Phillip Sanders	Kansas
William Frederick Schade	Missouri
Jacob Benjamin Schlund	Washington
Chauncey Wilcox Seagrave	Missouri
William Allen Shelton	Missouri
William Rudolph Steffens	Illinois
Eury Boon Strange	Illinois
William Struble	Missouri
George Haskell Taggard	Missouri
Leon Tiemann	Illinois
George Sherley Van Wormer	Illinois
Edward Albert Voigt	Missouri
Carl Yahlem	Missouri

UNIVERSITY OF SOUTHERN CALIFORNIA, DENTAL DEPARTMENT.

THE annual commencement exercises of the Dental Department of the University of Southern California were held on Thursday, May 18, 1905, in the Simpson Auditorium, Los Angeles, Cal.

Addresses were delivered by Rev. W. P. Ferguson, D.D., and by the dean, Garrett Newkirk, M.D.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

John Leslie Allen	Maxwell Merton Dixon	Jas. Arthur Metcalfe, Jr.
William H. B. Anderson	George Hiram Flanders	Ross Elmer Neel
Burrous Clark Arnold	Frank Albert Giguette	Harry Eugene Ransom
A. C. Ralph Bailey	Nye White Goodman	Harris Bernett Shepherd
Irving F. Baldwin	J. Lynwood Gresham	Horace Akin Smith
Horace Eaton Brown	Arthur Henley Jessup	Charles Brinkman Stare
Harry Gardner Brown	Arnold Bruce Leavelle	

MILWAUKEE MEDICAL COLLEGE, DENTAL DEPARTMENT.

THE annual commencement exercises of the Dental Department of Milwaukee Medical College were held at the Alhambra Theater, Monday, May 15, 1905.

The Rev. Richard F. Corcoran, S.J., delivered the doctorate address.

The degree of Doctor of Dental Surgery was conferred by the dean, Henry L. Banzhaf, on the following graduates:

T. D. Bartlett
G. W. Blaesser
H. G. Bridgman
C. F. Campbell
T. W. Coad
W. R. Cressey
H. M. Daudna
Max Goeres
W. L. Hocom
P. Hollis
R. H. Johnson
T. E. Johnson
P. E. Kabel
T. Kuechle
W. J. Maag
C. Mathieson
C. Mathews
J. W. Mudroch
W. J. Philips
H. J. Pohland
C. A. Scanlon
W. S. Sweet
W. L. Thiedeman
H. F. Thiel
A. W. Titel
F. A. Trager
C. H. Wake
J. W. Wedemeyer

OHIO MEDICAL UNIVERSITY, DENTAL DEPARTMENT.

THE annual commencement exercises of the Dental Department of the Ohio Medical University were held in the Board of Trade, Wednesday, May 3, 1905.

An address was delivered by Emory W. Hunt, D.D., president of Dennison University. The valedictorian was James Nelson Brown.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Ernest Haven Atkinson
Harvey Francis Bailey
Henry Allen Baker
Francis Basinger
John Edmund Betteridge
James William Blackburn
Charles Crowley Bonnett
John Perkins Brooks
James Nelson Brown
Edward Ernest Buhrer
Edward Clayton Bunch
Elber Bright Burke
Edgar Bartley Carpenter
Gurney Leroy Compton
William John Cosgray
Loran Lonnie Cramer
Robert William Deyo
Frank Charles Furniss
Harvey Austin Gontz
Bateson Gorsuch
Paul Sebastian Goss
Henry Harvey Gott
John Holland Hamilton
Fred Albertus Harmony
James Preston Haskin
Frank Herz
Philo Albert Kelso
Frank Maxwell Lose
Fred Hill McLean
Frank Ross Mann
William Forrest Maury
Charles Newton Mowry
John Ray Osborn
Cloyce Edward Overholt
Robert Clifton Paisley
Charles Jacob Pressler
Earl Vernon Prior
Ross Augustus Reed
Clinton McLane Scatterday
Arthur Samuel Scott
Charles Lawrence Seiffer
George Ellsworth Sheets
Clyde H. Smith
Eberle Dennis Smith, Jr.
George Albert Snider
Ray Spurgeon
Harry Moore Taylor
Robert McA. Temple
Charles Arthur Wall
Albert Ray White
Cecil Burton Wilson
Robert Wilson, Jr.
Jerome H. C. Wyscarver
John Knox Young
Guy Alfred Zimmerman

COLORADO COLLEGE OF DENTAL SURGERY.

THE annual commencement exercises of the Colorado College of Dental Surgery, Dental Department of the University of Denver, were held on Monday, May 15, 1905, at the Trinity M. E. Church, Denver, Colo.

Addresses were delivered by W. T. Chambers, D.D.S., dean, and J. H. Pershing, A.M.

The degree of Doctor of Dental Surgery was conferred by the chancellor, Henry A. Buchtel, D.D., LL.D., on the following graduates:

William Claude Adams
James Earl Billings
Samuel Francis Brannan
Harry William Dean
Mansel Homer English
Royal Chapin French
Juno Belle Kapp
James Ignatius Laughlin
Vernon W. Laughlin
Charles Alexander Monroe
Arthur Jackson Pate
Charles Allen Ramsey
Zenas Thompson Roberts
Clyde Lemen Taylor
Elmer Francis Warren
Charles La Vern Williams
N. Wolfson

UNIVERSITY COLLEGE OF MEDICINE, DEPARTMENT OF DENTISTRY.

THE annual commencement exercises of the Dental Department, University College of Medicine, were held at the New Academy of Music, Richmond, Va., May 18, 1905.

An address was delivered by Prof. C. Alphonso Smith, Ph.D.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

L. Cabell Bell	Connecticut	Richard Jones	Virginia
Benjamin Bloxton	Virginia	Maryan Buford Lewis	Virginia
Carl C. Bowman	Virginia	David K. Lockhart	N. Carolina
R. Owen Canada	Virginia	Frank Bell Miller	Virginia
Frank Garland Chamblee	N. Carolina	James Oscar Quaintance	Virginia
John Mabrey Coleman	Virginia	R. Floyd Waller	Virginia
Wm. Claude Fitzgerald	Virginia	Lawson Carter Womack	Virginia
Burman Oscar Grove	Virginia	J. Smith Yates	Virginia
Chancy Highsmith	N. Carolina	Paul Preston Yates	N. Carolina

COLLEGE OF PHYSICIANS AND SURGEONS, DENTAL DEPARTMENT.

THE annual commencement exercises of the Dental Department of the College of Physicians and Surgeons were held May 18, 1905, at the Alhambra Theater, San Francisco, Cal.

The degree of Doctor of Dental Surgery was conferred by the president, Prof. Winslow Anderson, on the following graduates:

Guy Owen Beem	Dyton J. Gilliland	Arthur Lyne Sobey
Gordon Frederic Cane	Herbert J. Gray	Louis Theron Smith
Jeremiah M. Carroll	Charles Lord Harvey	William Carleton Smith
Albert Barclay Cosad	William R. Lane	Albert Walter Stokes
Horace Cureton	Faith Sai So Leong	Charles John Tolton
Richard R. Dasher	Albert Mallett	Lewis Charles Weisbach
Dayton Dawn Davenport	Frank Tahoe McClaskey	Herbert C. White
Howard Palmer Davis	George McDaniel	Charles Woodworth Wilson
Andrew D. DeMartin	G. W. Mingus	Charles Ferdinand Wise
Walter James Dowell	Harry W. Moore	Manzuchi Yoshinaga
Richard Marcellus Ennis	Chester V. Murphy	Michael J. Zeller
Clarence Earl Fox	Walter J. Nordlund	Enrique Zuniga

WESTERN RESERVE UNIVERSITY, DENTAL SCHOOL.

THE twelfth annual commencement exercises of the Dental School, Western Reserve University, were held in the Beckwith Church, Cleveland, Ohio, Thursday, June 15, 1905.

An address was delivered by Rev. Newell Dwight Hillis, D.D.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Edward Newton Allison	Don Berry Ford	C. Stuart Mygatt
James Blaine Atchison	William B. Gerow	Milton Dodge Neff
David Boyd Bebout	Arthur Wiley Haines	Edwin Deroger Phillips
John Rogers Bentley	William Heller	George William Smith
Hugh Ross Binkard	Lee Everett Howk	Howard Garfield Weber
Charles Avis Brown	Lewis Henry Hutchins	Clarence E. Webster
Carl Herbert Clark	Alfred Churchill Knapp	Don Vincent Weedman
William Steen Deeley	Charles Thomas Magner	Harris R. C. Wilson
James Burton Ellis	Charles Hiram Maloney	Merrill Ladrew Winger
Lee Maro English	George Cubbison Mitchell	Frank Zavodsky

TUFTS COLLEGE DENTAL SCHOOL.

THE forty-ninth annual commencement exercises of the Dental School of Tufts College were held in Boston, Mass., Tuesday, June 20, 1905.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Henry Ash
Joseph Michael Blagdon
Frederick Garfield Bodge
Henry Edward Brenan
Bertel Gustaf Carlson
Fred Calvin Caswell
Charles Cummings Cole
George G. P. Dickinson
Harry Irving Dowd
John Eugene Dunleavy
George Francis Finnegan
John Francis Gately
Robert Horn
Wilbur True Lunt
Francis Ernest Mallette
Thomas Edward Marr
Justin Lawrence McCarthy
Frederick W. McGourty
Charles Samuel Mullin
George Page Nash
Shelly Barnes Osborne
Emile Alfred Roy
Fred Wilbur Tuttle
Henry Anson White
Frank H. G. Whitehouse
Alvin Thomas Wilkinson

STATE UNIVERSITY OF IOWA, COLLEGE OF DENTISTRY.

THE twenty-third annual commencement exercises of the College of Dentistry, State University of Iowa, were held in the University Armory, Iowa City, Wednesday, June 14, 1905.

An address was delivered by Hon. Chas. W. Fairbanks, vice-president of the United States.

The degree of Doctor of Dental Surgery was conferred by the president, George E. MacLean, LL.D., on the following graduates:

John Rubi Arnold.....Iowa
Amy Thornton Black.....Iowa
Guy Crawford .....Iowa
D. Murto Creighton .....Iowa
Henry De Mots.....Iowa
Richard Albert Greenawalt .....Iowa
Thomas Henry Hurst .....Iowa
Lyle Lawson Jeffers.....Iowa
Don Sherman Leach .....Iowa
Alexander Icabod McCord .....Iowa
Thomas Jefferson Miller .....Iowa
Frank Roland Molsberry .....Iowa
Robert Ashable Seydel .....Iowa
Clarence Andrew Stryker .....Iowa
Glenn Winfred Vail.....Iowa
Loyd Lane Whitsell .....Iowa

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING MAY 1905.

May 2.

No. 788,906, to WILLY HOMANN. Excavating bur for dentists.

No. 788,909, to JAMES W. IVORY. Dental Scraper.

No. 788,947, to CHARLES F. ROTH. Device for removing obstructions from between the teeth.

May 9.

No. 789,161, to SAMUEL H. LINN. Dental electrode for medicamental diffusion.

No. 789,415, to HENRY G. DRESSEL. Dental device.

No. 789,591, to FREEMAN DAVIS. Dental Appliance.

May 16.

No. 789,908, to WILLIAM HARE. Dental Cup.

No. 790,207, to GUSTAV HOLTZ. Dental bracket.

THE

DENTAL COSMOS.

VOL. XLVII. AUGUST 1905. No. 8.

ORIGINAL COMMUNICATIONS.

PREVENTIVE TREATMENT OF THE TEETH, WITH SPECIAL REFERENCE TO SILVER NITRATE.

By W. D. MILLER, M.D., D.D.S., Ph.D., Sc.D., Berlin, Ger.

(Read before the British Dental Association, at its meeting held at Southport, May 20, 1905, and published simultaneously in the Journal of the Association.)

IT is a fact which is naturally familiar to all practitioners of dentistry that operations on the teeth require much time, are difficult to perform, and are often exceedingly disagreeable, if not actually painful, for the patient. The insertion of a filling of gold or even of amalgam on the approximal surface of any tooth, including of course the preparation of the cavity and the polishing, requires more time than the amputation of a leg, and often more than a laparotomy, and when it comes to treating the root-canals of molars the time employed may be many times that required for the most vital surgical operation upon which depends the life of the patient. As a result of this condition of affairs the treatment of diseased molars is a luxury attainable only for a very small proportion of the human race—taking it the world over, possibly one in a thousand—and it seems to me that it should be one of the highest aims of the dental profession to make its services accessible to the millions of tooth-suffering humanity who at present are absolutely uncared-for.

We must therefore look upon it as just and commendable, when efforts are made to discover and introduce procedures which will diminish the tendency of the teeth to decay as well as simplify the treatment when once decay has set in.

Naturally our efforts as dental physicians should be directed, through the various hygienic measures at our command, to bringing about as perfect a development of the teeth as possible, since we must still cling to the idea that well-developed, perfectly calcified teeth are less susceptible to decay than teeth of the opposite character.

Furthermore, by the giving of proper attention to the physical and chemical properties of the food and to the daily care of the teeth on the part of the patient himself, we are able to do much to diminish the ravages of caries.

The introduction of plastic fillings was a very important step toward popularizing dentistry, and has been an incalculable boon to humanity. The attempt to find means and ways of so impregnating the necrotic dental pulp as to render

it permanently aseptic and innocuous, thereby doing away with the necessity of removing the last traces of it from tortuous canals, has not as yet met with as high a degree of success as was hoped for. It is very desirable that investigations on this line be continued, since there can be no doubt that if successful a great victory would thereby be gained over disease and countless millions of teeth saved that are otherwise extracted or simply allowed to rot away, spreading pain and disease all about them.

I shall not, however, discuss these factors here, but wish to refer to efforts of a more special nature which have been made to prevent the occurrence of dental caries or to check its progress. I call your attention only to the operation formerly extensively practiced, of making wide separations between the teeth by means of a separating file and to the more systematic V-shaped separations recommended by Arthur. These operations have now scarcely more than historical interest.

In recent years two different methods have been followed out in so-called preventive dentistry, the one employing mechanical, the other chemical, agencies to accomplish its purpose—the chief advocates of the former being Drs. Wright of Cincinnati and Smith of Philadelphia; of the latter, at present, Dr. Bryan of Basle. The first-named gentlemen recommend and practice what we may call extreme cleansing and massage of the teeth. Their patients are required to present themselves once a fortnight, or at least once a month, when every tooth is subjected to a rigorous cleansing and polishing on every surface, wood-points with pumice being used for the purpose. There can be no doubt that so thorough a cleansing of the teeth repeated at regular short intervals will do much to keep them and the gums in a healthy condition. Dr. Bethel, in the *Dental Summary* for March 1905, reports, after examining a number of Dr. Smith's patients, that all "had beautiful clean teeth and gums, wholesome, clean mouths, and there was an entire absence of that disagreeable odor noticeable from unkept mouths." It must not be overlooked, however, that any person who is willing to visit the dentist and spend several hours in his chair once a fortnight or once a month must naturally also spend much time over his teeth at home, and to this fact the condition of the teeth examined is no doubt in good part to be attributed. We have no reason to question the accuracy of Dr. Bethel's report, and we are agreed that much credit is due to the dentist who can inspire his patients with so much zeal in the care of their teeth. There is no doubt that much good would result if we would all, much more than has heretofore been the case, educate our patients as to the importance of constant care of the teeth and the manner in which the daily cleansing is to be performed.

The idea of Smith that by rubbing a tooth with a wooden stick once a month, or even once a fortnight, one can bring about a reaction on the part of the pulp and a solidification of dentin, cement, and enamel is, however, open to criticism. It is very doubtful whether a mechanical or chemical agent applied to the surface of the enamel has any influence whatever on the pulp of the tooth or can bring about any stimulation or increased activity in this organ. It is a fact well known to all who have made extensive studies of the teeth under varying conditions, that stimulations of the dental pulp from without manifest themselves in the formation of secondary dentin and in an increased translucency of the dentin corresponding to the part of the tooth acted upon. We find, however, that with few exceptions neither the wearing down of the enamel cusp nor the chemical disintegration of the enamel results in any reaction on the part of the underlying dentin (see Fig. 1) until the destruction of the enamel has advanced well toward or reached the surface of the dentin. If we wish, accordingly, to bring about a solidification of the hard structures of the teeth by massaging the external enamel surface we shall be obliged to keep up the rubbing until we have worn away a considerable portion of the enamel, which of course is as impracticable as it is undesirable. Moreover, the massage of the

tooth accomplished by rubbing the surface of the enamel once a month with an orange-wood stick is an insignificant quantity compared with the natural massage which the tooth undergoes three times a day in the process of mastication. Furthermore, whatever influence we are able to exert upon the development of an increase of susceptibility of the tooth to decay.

While, therefore, all measures tending to bring about more systematic and thorough care of the teeth are highly commendable, the excessive use of pumice is to be avoided and the attempt to induce solidification of the tissues of the

Fig. 1.



The wearing down of the enamel cusp at *a* produces no change in the underlying dentin.

the teeth through the physical character of the food results not so much from the action upon the pulp through the crown of the teeth as through the pericementum and the vascular tissues about the root of the tooth, the repeated impacts upon the pericementum being of the nature of a gymnastic exercise and determining an increased flow of blood and an increased vital action of the soft tissues of the tooth. It is also, to my mind, a question whether it is advisable by excessive use of pumice to rub away the enamel cuticle at points of the tooth which are susceptible to decay, as I have found that the destruction of this membrane involves tooth by rubbing the surface of the enamel with a wood point probably futile.

The use of chemical agents, and more especially the method of employing silver nitrate in the treatment of caries of the teeth, as recommended by Stebbins in the *International Dental Journal* for October 1891, is probably known to every practitioner of dentistry. Stebbins limited this remedy to cases where caries had already begun, whereas Frank (*Oesterr.-ungar. Vierteljahrsschr'ft f. Zahnheilk.*, 1897) recommended that it be employed not only therapeutically but prophylactically. He painted the sound neighbors of diseased teeth, as well as the

sound teeth in general of children in families liable to extensive caries. He also treated the margins of cavities, before filling, with silver nitrate, especially at points where recurrent caries might be expected. Even wedge-shaped defects (abrasion, erosion, denudation) may, according to Frank, be brought to a standstill by the application of silver nitrate. Frank was exceedingly enthusiastic in the recommendation of the nitrate for prophylactic purposes. Likewise Bryan (*Dental Review,* 1904) is an ardent exponent of silver nitrate as a prophylactic remedy.

Although thus enthusiastically recommended, silver nitrate enjoys but a very limited use either as a prophylactic or therapeutic agent, so much so that all of my endeavors to secure material for examination have thus far proved in vain with the single exception of one tooth kindly sent me by Dr. Bryan. It was chiefly in consequence of the communication of Dr. Bryan above referred to, presented at the congress in Madrid, April 1903, that I was induced to undertake the experiments now to be considered.

The questions which call for an answer are the following:

(I) *Does silver nitrate protect the dentin against the action of acids, and in what way?*

Pieces of ivory were treated with a concentrated aqueous solution of silver nitrate, which was allowed to act for from a few minutes to twenty-four hours. The pieces were then suspended in fermented solutions of peptone-sugar-bouillon or of sugar and saliva. After varying periods of time ranging from two to eight days they were taken out and sections were made passing through the point where the nitrate had been applied. In Figs. 2 and 3, photographs of such preparations are reproduced, which show a marked protective action on the part of the nitrate.

In continuation of this experiment human teeth were treated in a similar manner. The result was much the same, though not always so pronounced. As a rule the protection offered by the nitrate was most evident where the surface of the dentin had been slightly decalcified before the application was made.

In Fig. 4 a section of a tooth is reproduced which had two superficial approximal cavities. One of the cavities was very thoroughly bathed in a concentrated solution of silver nitrate, the remedy being allowed to act over night, and the tooth was suspended in the solution, where it was left for five months, the treatment being repeated every month. At the end of the time it was found that the decalcification in the cavity treated with the nitrate, *a,* had made but very slight progress, whereas in the other, *b,* it had gone on and finally reached the pulp. It should be noted, however, that the treatment was much more thorough than is accomplished in practice. The margin of cavity *b* was unfortunately torn in the preparation and a good half-millimeter of the tissue is wanting, which makes the contrast even more striking than it appears in the figure.

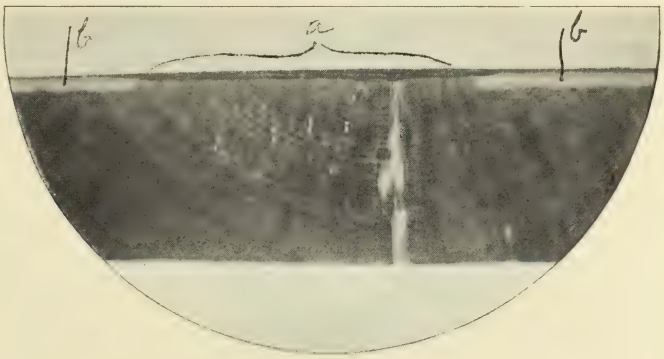
In all, over fifty experiments of this kind were carried out under varying conditions, the treatment in all cases being more intense than is arrived at in practice. As an example of the method of treatment, teeth were suspended for five days in a fermented sugar-bouillon solution in order to produce a superficial decalcification, then superficially dried and painted with a concentrated aqueous solution of silver nitrate, allowed to dry again for an hour in the air, and then reimmersed in the bouillon. After twenty-four hours the above treatment was repeated, the teeth on drying then showing an intensely black spot where the application was made. They were now suspended in the sour solution and allowed to remain for four weeks when they were taken out, again treated with silver nitrate, and re-immersed.

At the end of three months the teeth were finally removed from the solution and sections were ground passing through the spot where the application was made. Sometimes whole teeth were used, sometimes halves or sections about 1 mm. thick. Sometimes the sections were made

parallel to and sometimes at right angles to the dentinal tubules.

The results obtained confirm the impression which generally exists that silver nitrate applied to cavities of decay has a more or less pronounced effect in arresting the progress of the disease. The protection offered is naturally only

FIG. 2



Section of a block of ivory showing protective action of silver nitrate at *a*. The transparent layer *b* shows the depth of the decalcification of the unprotected dentin.

FIG. 3.



A part of Fig. 2 more strongly magnified.

The solutions were renewed from time to time during the experiment, which extended over periods varying from a few days to several months.

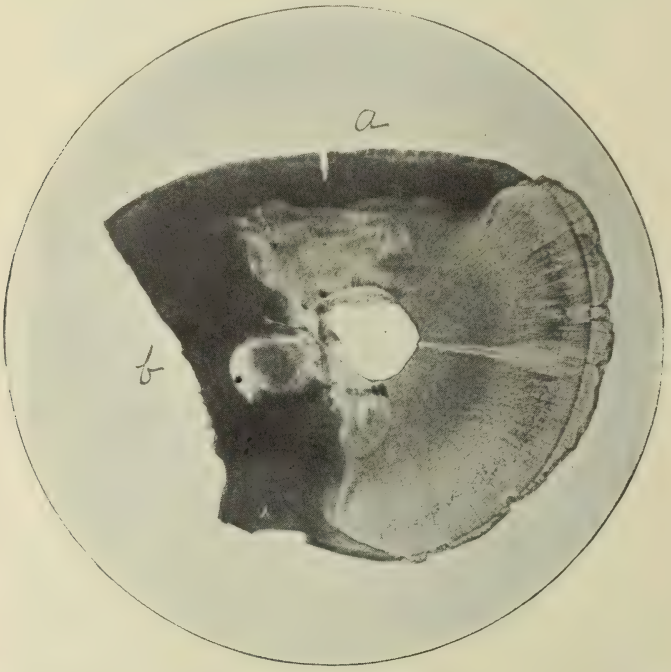
partial, and varies in degree in different cases.

Occasionally the nitrate failed completely to exert any protective action, as was observed in a few of the cases where the treatment was applied to the neck or root of the tooth. I was not able to find any reason for this exceptional action.

the above explanation seems to be sufficiently proved.

As a second possible explanation the idea suggests itself that the protective action of the silver nitrate is due to a coagulation of the contents of the dentinal tubules. Microscopic sections present appearances which support this view, al-

Fig. 4.



Decalcification checked by application of silver nitrate at *a*. (Decalcified tissue black.)

The question here arises: How does the silver nitrate affect the protection of dentin against acids?

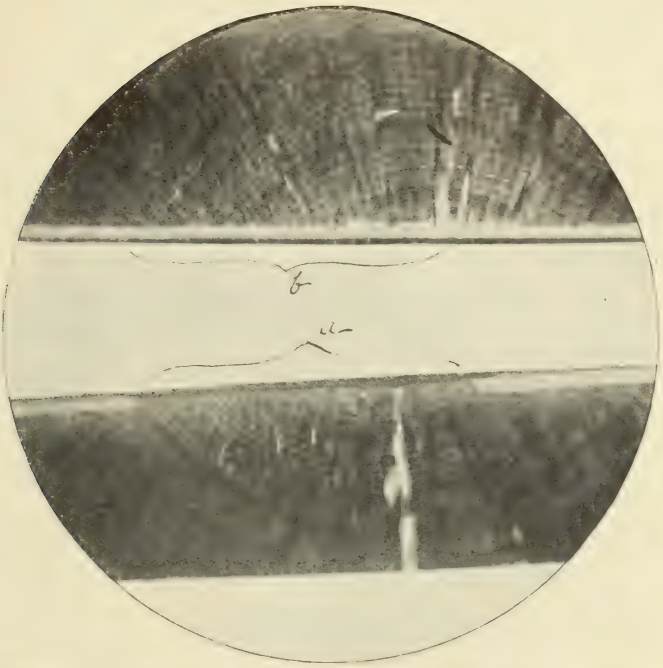
The most natural explanation seems to be that the precipitate of metallic silver in the superficial layers of the dentin forms a barrier more or less impermeable to acids.

To put this supposition to the test the tissue treated with the silver nitrate was kept in the dark so as to prevent the reduction of the nitrate from taking place. Naturally no discoloration of the surface treated was produced in this case. The protective action, however, remained the same, and thereby the untenableness of

though they do not definitely prove it. Further evidence in favor of it is given below.

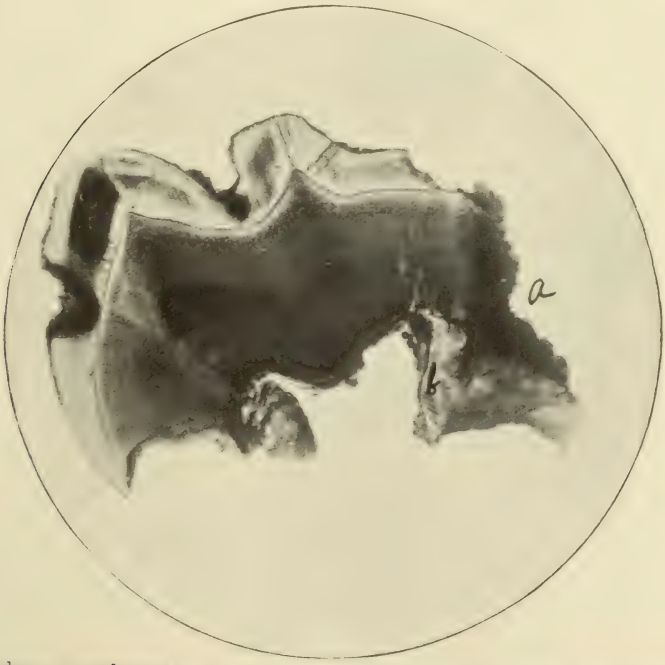
In order to prevent the unsightly discoloration of teeth treated by silver nitrate I first soaked the tooth in a concentrated solution of common salt, then applied the nitrate in the usual way, and thereupon the salt solution again—the idea being to obtain a precipitate of the insoluble chlorid of silver in the superficial layers of dentin. The attempt succeeded, and no discoloration took place. Unfortunately, however, teeth treated in this way showed no increase of resistance to the action of acids. This agrees with

FIG. 5.



Comparison of the protective action of silver nitrate, *a*, with protargol, *b*.

FIG. 6.



Deciduous tooth treated *intra vitam* with silver nitrate at *a*. Formation of secondary dentin at *b*.

the conclusion arrived at above that the protection afforded by the silver nitrate is not due to the formation of an insoluble inorganic precipitate in the tubules.

Among other salts of silver the argentum colloidale and protargol were tested as to their protective action. The results were completely negative. Fig. 5 shows the total absence of any protecting action on the part of protargol as compared with silver nitrate.

(II) *Does silver nitrate act by stimulating the dentinal fibrils and through them the pulp, thereby causing a solidification of the dentin and opposing a barrier to the progress of caries?*

A priori, I am very much inclined to doubt that any medicament applied but a few times to the surface of the enamel affects the pulp in any way whatever, and this view is completely in harmony with well-established facts. We know that the enamel possesses the power of transmitting irritations in a *very* limited degree only, and may become almost entirely disintegrated chemically without the underlying dentin being affected in any way whatever, as is seen in Fig 1, at *b* and *c*.

The only material for examination at my disposal was the tooth presented by Dr. Bryan, which, although the silver nitrate had been applied directly to the softened dentin, showed no evidence of any reaction on the part of the pulp, especially no deposition of secondary dentin and no solidification of the primary dentin such as manifests itself in the presence of zones of increased transparency. It is possible, however, that the pulp may have been dead in this case.*

* After presenting this paper before the meeting at Southport, Mr. W. C. Grayston kindly handed me four teeth which had been treated in the mouth with silver nitrate. Two of them were deciduous molars, the roots of which were completely absorbed, from which, in connection with the general appearance of the teeth, I infer that they were in a perfectly normal condition at the time they dropped out. The other two were bicuspids with superficial caries extending around the necks; in these also the pulp seemed to have been in a normal condition. Sections of these teeth, stained with picrofuchsin, showed in some parts an apparent arrest of decay. In the two deciduous teeth and in one surface of one of the bicuspids there was a layer of softened dentin about ½ mm. in thickness beneath the totally blackened layer which had become impregnated with the nitrate. Whether this softened layer formed subsequent to the treatment with the nitrate or was present at the time of the treatment and did not become penetrated by the nitrate it is impossible to determine. At all events the teeth indicate a marked arrest in the progress of the decay, and the fact that the deciduous teeth remained in a perfectly healthy condition until their natural time of service had completely expired is sufficient evidence of the success of the treatment. In all of the teeth a formation of secondary dentin had taken place (compare Fig. 6), but as we usually find such formations in case of chronic caries, it is impossible to say in the present case whether it be due to the direct action of the silver nitrate or is simply a result of the chronic condition of the caries. We may say, however, that the silver nitrate tends to induce a solidification of the dentin and formation of secondary dentin, in as far as it converts an acute into a chronic caries.

PROTECTIVE ACTION OF SILVER NITRATE UPON THE ENAMEL.

The reasonableness of treating sound teeth with silver nitrate as a preventive against caries is based upon the supposition that it affords a protection to the enamel against the action of acids. It accordingly became necessary to test this supposition experimentally:

(1) Sound teeth whose enamel surfaces had been painted in alternating zones were subjected to the action of 2 to 5 per cent. solutions of hydrochloric acid.

The time required to break up the union between the enamel cuticle and the enamel was not prolonged in the zones which had been acted upon by the nitrate.

(2) Sound teeth treated in like manner as under (1), until black bands or spots had formed upon their surfaces, were subjected to the action of weak organic acids, obtained by the fermentation of sugar-bouillon solutions mixed with saliva, for periods varying from a few days to several months.

Sections made at the close of these periods revealed the fact that the nitrate had offered no demonstrable protection to the enamel, and that the acid had attacked the blackened surface as readily as

the parts which had received no treatment. This is clearly brought out in the accompanying photographs (Figs. 7 and 8).

These results leave much room for doubt as to whether the advantage gained by the use of silver nitrate for prophylactic purposes (if there be any at all) is

FIG. 7.



Silver nitrate applied as indicated by the bracket; the black band (decalcified tissue) is as broad here as in the neighboring parts. The greater thickness at *a* is due to an abrasion of the surface.

FIG. 8



Exposed enamel prisms treated with silver nitrate at *a*. No protective action compared with *b*, which was not treated, the decalcification being equally deep at both points.

sufficient to offset its very considerable disadvantages both as to its escharotic and poisonous properties as well as to the discoloration produced by it.

PROTECTIVE ACTION OF PARAFFIN, TANNIC ACID, ETC.

Pieces of ivory which had been superficially decalcified were dehydrated in absolute alcohol, dried, and dipped in a warm solution of paraffin in chloroform. The paraffin simply adhering to the surface of the ivory was rubbed off, as it naturally would be in the mouth, and as only the paraffin which had really penetrated the tissue could be relied upon to produce any protective action. These pieces were then suspended along with others similarly treated, minus the paraffin, in solutions of weak organic acids.

The result of this impregnation was to produce a marked arrest in the progress of the decalcification. I shall await the results of the treatment of freshly extracted teeth before giving any opinion as to the advisability of experimenting with paraffin in practice. The necessity of dehydrating the tissue and keeping it perfectly dry during the application of the paraffin will very seriously interfere with its use.

I also tested the oil of cinnamon, alcohol, zinc chlorid, mercury bichlorid, and tannic acid in respect to their possible protective action upon the dentin. Pieces of ivory were superficially decalcified by exposing for two days, to the action of ½ of one per cent. solution of lactic acid, and then suspended for twenty-four hours in the solution whose action was to be tested; one piece, to serve as a control, being suspended during the same twenty-four hours in water. They were all re-immersed in the ½ of one per cent. solution of lactic acid, where they were left for eight days. At the end of this time the decalcification had made about the same progress in all the pieces, and in no one could I detect a particular arrest of the process as compared with the piece which was used as a check.

DIFFERENCES IN THE PREPARATION OF CAVITIES FOR FILLINGS AND FOR INLAYS.

By C. N. JOHNSON, L.D.S., D.D.S., Chicago, Ill.

(Read before the Connecticut State Dental Association, at its forty-first annual convention at New Haven, Conn., April 18, 1905.)

THE introduction of inlay work as a means of saving the natural teeth, has furnished a new problem for the dentist to solve in the way of formulating a proper system of cavity preparation for this class of work. It cannot be expected that operators who have for years habituated themselves to the study of the principles involved in the preparation of cavities for fillings will be able immediately to readjust their point of view sufficiently to approach the preparation of cavities for inlays to the best advantage, and it is confidently believed that this is one of the reasons why inlays have not been more successful, even in the hands of those who have been most enthusiastic in their use.

It is the purpose of the present paper to point out some of the differences in the details of cavity preparation for fillings and for inlays, to be illustrated by cavities cut in tooth-forms of natural size, the one cavity for a filling, the other for an inlay. The aim is not so much to show cavities of typical or ideal form as it is to demonstrate the general differences in cavity formation for the two methods in similar locations. Neither is it claimed that in the minutiæ the cavi-

ties here exhibited are perfect in outline or in principle. Teeth vary in form and in their manner of decay, and the problem must be met in each individual case according to the necessities presented.

The one distinctive feature to bear in mind always is that a cavity for a filling should be of such a form that the filling when inserted cannot be lifted out of it, while the requisite of a cavity for an inlay is that the completed inlay may be inserted and removed at will. The first thing for the inlay worker to learn is that the cavity must be widely extended at the orifice, and no man can successfully insert inlays without the will to freely sacrifice tooth tissue in many instances. The next thing to learn is that a mere saucer-shaped cavity with little depth relatively to its width cannot be depended on for the retention of inlays. The impression is too prevalent that the adhesive properties of cement are all sufficient for retaining inlays without appreciable penetration of the inlay, into the structure of the tooth. An inlay must have some body to it to remain securely seated in a cavity when subjected to stress, and it should so dip down into the tooth that it cannot be easily rocked or tilted by pressure on either side even before any cement has been used to seal it. The lateral walls of the cavity cannot of course be undercut or even perfectly parallel, on account of the impossibility of removing a matrix fitted into such a cavity, and yet the walls should not be made to flare so widely from the base to the orifice as we frequently see them.

For fillings, we believe the best results are to be obtained by joining the walls of cavities with angles—for instance, the axial or pulpal wall should be joined to the surrounding wall with a sharp right-angle—but for inlays the general plan must be one of curves. If angles are used at all they should be obtuse and not sharp, except in cases where the matrix may be lifted bodily away from the angle. It is the difference between the use in a cavity of an inverted cone bur and a round bur—between a hoe or hatchet excavator, and a spoon excavator.

In the labial cavities in central incisors herewith submitted for your inspection, you will notice that the one for a filling (Fig. 1) has a sharp right angle between the axial wall and the entire sur-

Fig. 1.

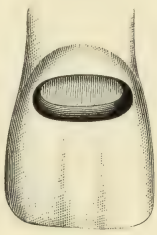


Fig. 2.



rounding walls of the cavity, and that a filling properly adapted to such a cavity could not be dislodged short of breaking either the filling or the walls; while the one for an inlay (Fig. 2) has diverging walls with an obtuse angle between the axial and surrounding walls. From such a cavity a matrix for an inlay may be lifted without distortion, and yet it will be noted that provision is made for appreciable bulk to the inlay, and no thin margins such as would be present in a saucer-shaped cavity. The axial wall also presents a flat seat for the inlay to rest upon, although the area of the axial wall is not so great as the cavity at the marginal outline.

In the two approximal cavities in incisors where the incisal angle is involved,

Fig. 3.



requiring a contour restoration, the one for a gold filling (Fig. 3) is prepared with decided angles in the gingival region—the gingival wall being carried somewhat labially and lingually, to widen it and produce a dovetailed effect. At the termination of the anchorage step there is also an angle with a slight depression rootwise, to form an interlocking of the

filling. The labial plate of enamel is shortened somewhat on the incisal edge to admit of a small amount of gold being built over it for protection to the enamel. In the use of gold in these anterior teeth the exposure of the filling material becomes a matter of careful consideration, and in the protection of enamel it is often found that a thin layer of well-condensed gold is sufficient. This can never be said of porcelain, and while we are considering in a broad way the preparation of cavities for gold inlays as well as porcelain, the call is almost universally for porcelain in these anterior teeth, and when that is used there can be left no thin edges for protection. Porcelain demands bulk for strength.

It will be seen that a filling adjusted to this cavity could not be removed short of breakage, and so it is not adapted

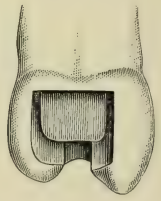
Fig. 4.



to inlay work. There are two methods to be used in preparing such a cavity for an inlay: either to cut away the incisal portion of the labial as well as lingual plates of enamel, creating an L-shaped inlay reaching part way across the end of the tooth with appreciable thickness of porcelain at this point, or else to prepare the cavity as indicated in the model (Fig. 4), by leaving the labial wall standing to the extreme incisal end, and cutting away the lingual very freely to arrange for bulk to the porcelain in this region. It may be argued that this form of preparation provides little retention to the inlay from dislodgment under pressure toward the lingual, but most of the ordinary stress against such an inlay comes from the lingual toward the labial, and it would be difficult to dislodge the inlay in this direction. Not only this, but an inlay set in such a cavity under pressure, with a good cement which does not shrink, will stand considerable stress toward the lingual—enough at least for all practical purposes, as has frequently been demonstrated in the mouth.

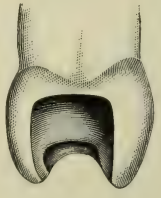
In the approximo-occlusal cavities in the bicuspids the one for a filling (Fig. 5) is marked by sharp angles between the axial and gingival walls, and also

Fig. 5.



at the junction of the axial with the buccal and lingual walls. There is a sharp point-angle in the gingivo-axio-lingual and gingivo-axio-buccal regions, giving a distinct mortised or dovetailed effect to the approximal portion of the cavity. In the anchorage step in the occlusal portion, the floor is perfectly flat, with an angle between it and the surrounding walls of the step. The step terminates in an abrupt perpendicular wall, while the width of the step bucco-lingually at this point is greater than it is midway between the cusps. All of these interlocking

Fig. 6.



forms are advantageous in the retention of a filling and tend to its most secure anchorage, but an inlay would be altogether unmanageable in such a cavity.

It will be noticed that the cavity for the inlay (Fig. 6) in the other bicuspid has been extended very much wider bucco-lingually at the occlusal surface than the one for the filling, and the general scheme of angles has been abandoned.

The walls join each other on short curves rather than angles, and the cavity, while quite deep, is of such a form that a matrix for an inlay could be fitted to it and removed without distortion.

These are the chief differences to be noted in preparing cavities for fillings and for inlays in the three classes of cavities illustrated, and they embody in a general way the differences in all classes. There are other distinctions in some of the minor details which will be readily apparent to every operator, such for instance as the greater liberty in beveling and overlapping thin enamel where gold inlays are used than for fillings. Melted gold of 18- or 20-karat will be stronger to given bulk than a malleted filling, and it can be beveled to thinner margins with greater safety.

But in these details each operator's judgment must suffice. It is only with the broad question of general cavity formation in a few of the different classes that the present paper has to deal.

SOLDERING WITHOUT A BLOWPIPE.

By L. G. NOEL, D.D.S., Nashville, Tenn.

(Read before the Oklahoma Dental Association, at its fifteenth annual meeting, Oklahoma City, May 16, 1905.)

MUCH of the soldering with 18- and 20-karat gold may be done without a blowpipe, and can be accomplished with much less risk of fracturing porcelains or melting off the gold backings than where the work is subjected to the sudden blasts of intense heat produced by the blowpipe. The apparatus for this method of soldering is extremely simple, and is usually found in every laboratory that is supplied with gas for heating and lighting purposes. It consists of a burner, as shown in the illustration, such as we employ for heating water and for many other things. This burner is constructed on the Bunsen principle, admitting sufficient air at the bottom to consume all the carbon in the gas, and giving through its many openings tiny jets of blue flame of intense heat.

The wax should be washed out of the investment with a stream of boiling-hot water. The work should be coated with a solution of borax wherever it is desirable to have the solder flow. We prepare the flux by grinding a lump of borax upon a slate with a little water until we get a cream-like mixture, which we apply with a small camel's-hair brush. We select a lump of charcoal with a flat surface and trim it to fit into the bottom of the burner without tilting. Now we cut out a depression in the top of this lump for the reception of the work, and shape it so that the investment will rest with such inclination as to favor the gravitation of the solder in the direction desired. Next, build the charcoal about the work, erecting a sort of log cabin around it, which is to be roofed over with flat pieces, to radiate the heat back upon the work.

This little kiln of charcoal should be so constructed that the pieces will lie firmly, and not roll down and disturb or shake up the work when burning. An opening should be left at the front so as to give a view of the work and an opportunity to put in more solder if needed.

Before setting the piece on the fire the solder should be clipped into small pieces and coated over with borax. The bits of solder may be dropped into the cream borax on the slate and removed thence to the work with the pliers until enough (or nearly enough) has been applied to solder the case.

Having erected the kiln, as described, about the loaded piece, the gas is lighted

and it is left to heat up. The object of the overhanging roof of charcoal is to radiate the heat back upon the work, and when these flat pieces are heated to incandescence a surprisingly high degree of heat is obtained. It is necessary to arrange the room so that drafts and counter-currents of air will be avoided.

Fig. 1.

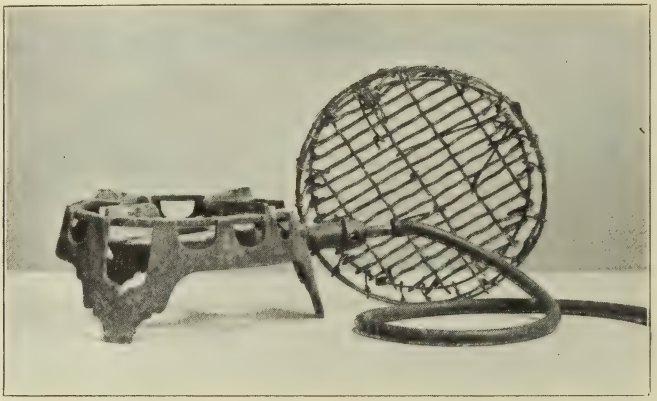
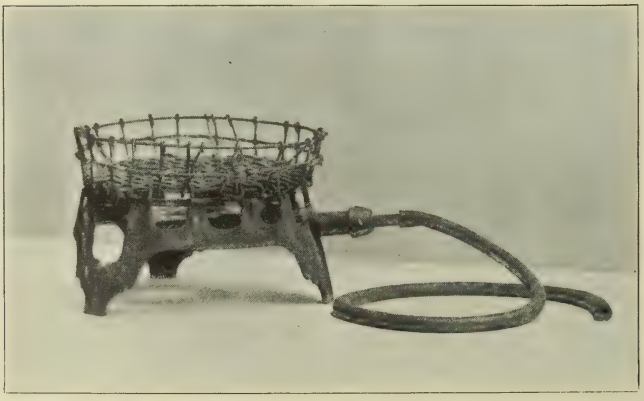


Fig. 2.



In summer the work-bench may be arranged in a window, and the sash opened a little at the bottom, in order to give a drafts upward through the coals. Side drafts must be avoided.

In filling dummies, or making bridges requiring extensive filling, after the first charge of solder has melted it may be fed in a piece or two at a time, and will melt rapidly and flow like so much wax or grease under this uniform heat. I frequently fill two or three dummies at a time, or solder large bridge-pieces carrying six, eight, and ten teeth at a single firing. In some instances I have timed the work from the moment of lighting the gas to the time of completing the filling of the work with solder, and I have seldom consumed more than twenty minutes.

For large bridges requiring a heavy investment I have devised a larger burner, taking a small gas-stove burner such as the gas companies supply, and having a basket of heavy wire made to rest upon its top to carry the charcoal, as represented in the accompanying illustration.

My satisfaction in soldering by this

method is such that I do not find much use for a blowpipe for 18- and 20-karat gold solder. When a large quantity of solder is required, the blowpipe flame big and flaring, but not with the full blast, may be directed under the bed of coals and quite under the work, to make a final even flow of the solder; but it is seldom that I use it to this extent.

The addition of quantities of powdered borax is unnecessary provided the solder has been well coated with cream borax, and this practice often results in cracking the porcelain facings. I think the cooling and contracting of borax a more frequent cause of fractured porcelain facings than the contracting of solder, for the investment takes it up like a sponge, allowing it to flow around the facings.

For practicing this method in small towns and country places where there is no supply of illuminating gas, a gasoline burner such as is now being used for cooking may be used.

The secret of successful soldering is to keep the heat under the work and to raise the temperature of the work gradually to the melting-point of the solder, which should be in place ready to flow when the plate is ready to receive it. When possible to do so, all pieces should be dropped into sulfuric acid and cleaned off nicely before investing.

The whole process should be conducted with scrupulous cleanliness. No foreign matter should be allowed to get into the work. The hasty investment of cap and pin for a Richmond crown, just as taken from the mouth, with a little saliva and a little blood upon the work, often results in a failure to flow the solder perfectly, because the burning of blood leaves carbon and such waste products, which prevent the flow of the solder.

Another method of soldering without a blowpipe is by electric heat in a porcelain furnace. Some dentists are using this quite successfully for soldering the platinum work with pure gold for porcelain crowns. I have not experimented with electric heat for soldering, but I think it is the coming method. It appeals to me as worthy of careful experimentation because of the ease with which the electric current can be governed, enabling the operator to raise the temperature gradually to very high degrees.

If these suggestions result in inducing some of you to take up this method and perfect it, the writer will be quite well repaid for writing these lines.

THE ETHER SPRAY IN DENTISTRY.

By CRITTENDEN VAN WYCK, D.D.S., San Francisco, Cal.

THE era of genuine painless dentistry is fast approaching. Side by side with the wonderful advance along the lines of scientific research and the innumerable new appliances for both operative and mechanical dentistry, is the advance in new methods which permits of doing all work in the mouth painlessly. As this field is too broad to cover in one article, the use of an ether spray for excavating sensitive dentin will alone be discussed.

This method, which has had several years' test, is becoming more popular with our profession every month, especially on the Pacific Coast, where scores of ether-spraying machines are in successful operation. In the April 1904 Cosmos the writer described the invention as then used. It comprised two metallic delivery tubes uniting in a tiny nozzle from which the spray was emitted and directed to the drill point. These tubes and nozzle are arranged to attach to any handpiece, and

the spray is controlled by lever valves piercing the metallic tubes. The attachment of the device to the handpiece has several serious objections, viz, the additional weight and enlargement of the piece; the impossibility to change instantly to the right angle; and the inability to change the drill point without removing the spray from the tooth. The normal temperature returning very quickly, there is hardly time to change a bur without causing pain when directing the spray on the tooth again, after the change.

The method and effectiveness of the ether spray is beyond dispute. It is an absolute obtunder, due to the coldness occasioned by the rapid evaporation of the ether by the compressed air, and the finely atomized spray which is emitted from the nozzle.

A new device which is giving satisfaction is one which is not attached to the handpiece at all. The metallic tubes which deliver the air and ether are attached to the rubber-dam spreaders. The nozzle is a flexible metallic tube three and one-half inches long, with sufficient inherent rigidity to maintain any position into which it is bent. The temperature of the tooth being reduced in the usual manner, the metallic tubes are then fitted into a spring clasp on the spreaders and the nozzle bent so as to spray on the tooth desired.

This method does away with the objections of weight on the handpiece and its additional size, a change to the right angle can readily be made and the drill points can be changed without hurry, as the spray is running entirely independently of the handpiece.

To those who have not seen the spray used nor had it tried in their own mouth, the thought of the intense coldness or the odor from the ether are apt to present themselves as objections. The fact that patients who have once had the ether spray used, always return and want it again for some other cavity; that patients speak of the method in most flattering terms of praise, indicates that there is no objection on the part of the patient.

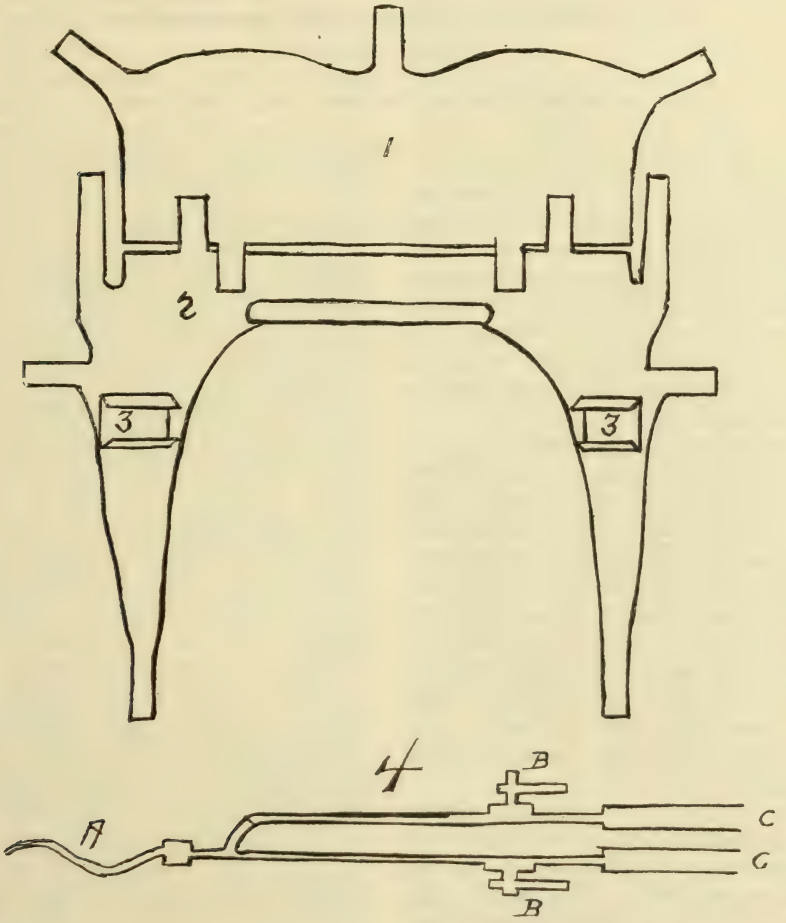
Having the tooth isolated by the rubber dam, a piece of cotton is placed over the tooth and the spray directed upon it. When the ether has saturated the cotton a coldness is felt, but not of a severer nature than when ice-cream is first placed within the mouth. After an average of a few moments' spraying on the cotton it is removed and the spray directed upon the tooth itself. If extreme coldness is at any time felt, the spray is stopped instantly and then begun again. From two to five minutes are required to reduce the temperature of any single-rooted tooth and from five to ten for any of the bicuspids or molars. The spray is continued during the entire excavating of the cavity.

In regard to the odor. A removable shield is provided to protect the fumes from the patient. As a very small atomized spray is used, the quantity of ether used at any period is very limited, and owing to its rapid evaporation, this method can be used upon anyone with impunity. It is well to have plenty of fresh air circulating in the operating room during the time the spray is being used. If a few drops of a strong extract, say of violets, rose, or "Jockey," are placed in the ether tank, the ether odor is almost entirely disguised and the spray is then a pleasant odor to both patient and operator.

Here, then, we have a positive method for doing absolutely painless drilling, or grinding down a tooth preparatory to crowning or exposing pulps for devitalization. Pulp-extirpation may be accomplished in any of the six anterior teeth by this method. The greatest benefit in the use of the ether spray lies in the fact of its being the only absolute and positive obtunder applicable to all cavities. Cavity preparation and filling may be accomplished at one sitting; it is a great time-saver; it allows of thorough cavity preparation, extending the margins beyond the "area of liability," or of cutting wide for porcelain; and what has heretofore been a most trying ordeal for two people, exhausting the vital forces of both, is now so simplified that the former dread of the dental chair and abhorrence of the "drilling machine" has passed for the patient, and the dentist himself is

not worn out by having to worry with and coax along the average patient during the cutting of the dentin.

The lapse of over three years since chiseled off in the usual manner, the actual spraying time is of such short duration that freezing does not take place, the temperature reaching about 46° F.



The diagram shows the improvements from the new method of delivering the ether spray.

A glass vessel containing the ether is suspended by a chain from the head-rest, and rubber tubes about three feet long connect therefrom with the metal tubes at *C C*, as shown.

A compressed air outfit is a necessity, as twenty pounds of compressed air forces the ether into the tubuli of the dentin, chilling the contents and permitting painless drilling. The usual elastic band passes around the head and holds the dam-spreaders in place.

When the temperature of the tooth has been reduced, the metallic tubes, as shown at *4*, are placed within one of the spring clasps, as shown at *3 3*, and the nozzle *A* is bent to throw the spray on the tooth desired, the spraying to be continued during the preparation of the cavity. When drilling is over, the shield (*1*) is then removed and the filling inserted.

this method was first used has given ample time to prove that there are no after-effects. The normal temperature returns within a few moments after removal of the spray. If frail margins are first

Clinics by the writer, showing the latest improvements in the ether spray appliance, were given during the recent Lewis and Clark Dental Congress, at Portland, Ore.

FORCES EMPLOYED IN PLACING GOLD IN TOOTH-CAVITIES.

By B. HOLLY SMITH, M.D., D.D.S., Baltimore, Md.

(Read before the Georgia State Dental Society, May 4, 1905.)

I. WITH COHESIVE GOLD.

PERCUSSION. It is an accepted fact that this form of force more nearly fills the requirements for condensing and packing cohesive gold than any other; and instruments and appliances have multiplied for producing blows more or less rapid, which can be delivered to the plugger and through that to the gold surface.

The use of this form of force was coincident with the introduction of cohesive gold—or followed it very closely. The mallet had been used prior to this time for condensing the surface of non-cohesive gold fillings, but was not in general use until cohesive gold began to be employed; since that time it has been regarded as its most important ally, and today the successful use of cohesive gold without some form of mallet is considered too tedious and uncertain to be practicable.

For the purpose of packing gold by the use of percussion the hand mallet has been supplemented and displaced by the spring or automatic, the pneumatic, electro-magnetic, and mechanical mallets—each enjoying such a share of popularity as to entitle it to separate consideration.

If conditions were constant, it would be perfectly practicable to develop a mechanical arrangement which would deliver at a uniform rate an ideal blow, unsurpassed in usefulness by any variety of efforts at percussion. Varying conditions, however, such as sensitive surfaces and frail margins, necessitate certain modifications of what might otherwise be considered (strictly for the purposes of welding and condensing the gold) ideal force, and cause it to be acknowledged that such mechanical mallets can only approximate the highest usefulness of intelligent hand-mallet force. Those devices have, however, a wide field of usefulness, and multiply the facility for operating with cohesive gold to such an extent that anyone familiar with their employment would be quite at a loss without them; indeed, some of the most skilful operators with the hand mallet have learned to look upon the electro-magnetic mallet as the mainstay in long operations with cohesive gold, and to use the hand mallet only as an accessory. The necessity is therefore indicated for a thorough familiarity with the uses of these instruments, that a wise discretion may assist in the selection of the one best suited to facilitate the work in each of its different stages.

Hand mallets in present use are made of steel or lead. The former has some advantages; it delivers a sharp blow, which may be repeated with greater ease and rapidity on account of the rebound from the plugger; it has, however, the disadvantage of requiring a nice adjustment of the relation between the weight of the mallet and that of the plugger, and is more noisy than the lead mallet. The soft blow of the latter is usually more agreeable to the patient, and is unquestionably productive of sufficiently good results to entitle it to the popularity it enjoys.

Lead mallets of various weights up to fourteen ounces are employed, rapidity of blow being sacrificed to weight, for the mallet must be sufficiently heavy to admit of short, quick blows, effectively producing condensation.

The hand mallet applied by the assistant deserves no special consideration. Compared with the mechanical mallet it possesses decided disadvantages, as the

failure to interpret the code of signals correctly may result in a blow entirely unsuited to the occasion, while the mallets set to deliver a fixed blow may be expected to perform their offices with uniform and unvarying regularity.

Dr. Ottolengui says, "There is one feature in the ordinary hand mallet that is not to be found in any other; the patient is connected with the mallet only at the exact moment of contact, as the blow is struck. With all other mallets the patient is practically connected with the instrument behind the mallet all the time." This advantage from the standpoint of the patient is entitled to consideration, and in addition we have an unquestionably greater one in the opportunity for discrimination in the blow, afforded to the operator who wields the mallet himself; he may readily pass from a blow of sufficient weight to condense the heaviest foil with one impact of the instrument, to one the force of which would not irritate the most sensitive pulp or do violence to the frailest cavity wall. Every step of the operation is thus directed by the operator's mind and executed by his fingers; the machine element is largely eliminated, and the work becomes in every sense more artistic; each operation possesses individuality, and the trained eye and hand will vary the procedure to suit each emergency; the range of the mallet being so great, it can be made to accommodate itself to any extreme. For these reasons this method of securing condensation, or welding gold, has advantages over any other which has been or will be suggested; and while such considerations as economy of time and labor may induce many to adopt the electric or mechanical mallet for the bulk of work, yet none of these can entirely fill the place of the hand mallet, and the operator who has acquired facility in its use will have recourse to it constantly for covering margins and at critical stages of difficult operation.

The automatic mallet is a useful instrument in its place; two or three should be kept with blows arranged of varying degrees of force. It seems unjust to condemn an instrument which so many use with comparative success, but the conviction is firmly fixed in the writer's mind that the automatic mallet should not be the mainstay in condensing gold; that, in fact, it finds its greatest field of usefulness in filling small sulcate cavities where the operation is to be performed without the use of rubber dam. The character of the blow and the means pursued to develop it are not favorable to the use of this instrument in covering enamel margins, or doing the finer grades of cohesive gold operations. Nearly any other form of mallet in common use is better for contour operations on the front teeth; yet in molar teeth it occasionally becomes the ideal form of instrument.

The pneumatic mallet has never grown into universal popularity, but is used by some with comfort and success; it is usually operated by foot-pressure on a bulb placed upon the floor; the pressure forces a column of air against a piston with such force as to deliver to a plugger a tolerably sharp, quick blow, modified somewhat by the skill of the operator. In comparison with the electric or engine mallet this method is slow and laborious and deserves to fall into disuse.

The Harris pneumatic mallet and engine head is highly indorsed by some who have used it. The revolution of the small wheel on the cable drives a piston in the box or pump located on the engine stand; the blow is entirely under the control of the operator's thumb and finger, and may be instantly suspended. The blow is obtained without pressure, allowing the plugger to be moved freely over the surface of the filling without lifting the instrument. The blow is sharp and distinct and of course depends for rapidity upon the revolution of the engine. The instrument has the advantage of being light and easily handled.

The Bonwill mechanical mallet with the latest improvements is perhaps deservedly the most popular instrument of its kind. The substitution of vulcanite for steel in the handle of the recent pattern makes it more agreeable to handle; and the finger-guard, slip-joint, and modification for longer plugger points are improvements. The weight of the mal-

let, added to that of the engine arm, is a decided disadvantage, hence when a balance for the latter can be secured by a suspended pulley or such engine arms as are found on the Darby-Perry, Doriot, and other engines, where the weight is not so noticeable at the handpiece, the use of the mallet becomes less fatiguing to the operator. When the engine is driven by an electric motor this instrument becomes a formidable rival of the electro-magnetic mallet.

Dr. J. H. McKellops suggested as an improvement to the Bonwill engine mallet a spring placed under the rim of the wheel, giving a more elastic blow. He also changed the arrester so as to facilitate its action.

The Powers engine mallet and the Wilmington engine mallet No. 1 have the advantage of being of a size and shape which add to the convenience of their use. The blow delivered by these mallets is very similar, being produced by contact of opposing sharp bevels, and in the rapid revolution of the engine a sharpness and weight of blow is secured, which is beyond what might be expected from the repeated contact of such surfaces. The stroke is delivered with sufficient rapidity, but depends somewhat for its force upon pressure exerted upon the filling with the plugger point, and does not allow the penciling or gliding motion, which is the ideal procedure and a great advantage in the use of the electro-magnetic mallet.

The Bonwill electro-magnetic mallet must be regarded as very nearly filling the requirement of a power mallet, giving facility and ease to what is ordinarily a most difficult process, and accomplishing results positive and uniform in the hands of an experienced operator.

It is not to be expected that the mere possession of such an instrument is a guarantee that good work will follow its use; training and skill here as elsewhere must be associated with superiority. Those who recall the easy and graceful movements of the instrument in the hands of the late Marshall Webb, and contrast them with the misuse of the instrument in the hands of an inexperienced operator, will be slow to allow that this instrument and the tiro are well mated. As electricity becomes more available and the mallet ceases to be dependent upon what has been considered the annoyance of a battery and its care, it will be more generally used and a better class of operations will inevitably result.

One of the chief advantages is that the plugger point may be penciled (*i.e.* moved over the surface of the gold without pressure), with sufficient rapidity to prevent the delivery of more blows at a given point than are essential for the condensation of the gold; thus the surface of the filling is always alive with cohesion, which is not the case where excessive malleting is done. With mechanical mallets requiring pressure a number of successive blows are struck at the spot where the pressure is exerted and before the removal of the plugger, consequently the gold at this point is not in an ideal condition for the reception of another piece. Pressure on the plugger with the electric mallet increases the noise and makes it an unpopular instrument with the patient.

The management of the strip of gold will not be the least important feature in the use of the electric mallet. As will appear from what has been said, a fair field is essential; and to this end a certain regularity should always obtain in the placement of the material, the margins being a little in advance of the center with a gentle and regular slope retained throughout. Any frequent doubling of the gold at one point results in ridges and irregularities, and consequently an imperfect operation, and defeats the ideal manner of using the plugger, *i.e.* the gliding or penciling of the point from one extremity of the filling to the other, with a gentle and regular sweep. The use of this instrument is indicated when such a manner of handling it is possible. This opportunity is found in large contours; it is less useful than other instruments in small pinhead cavities and other contracted spaces.

It is a just compliment to the Bonwill electro-magnetic mallet to state that while it has been modified and improved since its invention, no form of instru-

ment has been suggested which has proved so popular as to supplant it, in spite of the fact that many skilful and ingenious men have given attention to the subject.

The Russel electric mallet, invented by Dr. Perry Russel, possesses several notable features. It is simple in construction, and resembles the automatic in size and weight. All the moving parts are inclosed within its vulcanite case, which reduces to a minimum the noise of operation. Being devoid of slides or switches manipulated by the fingers, it may be grasped in any manner, and the weight is so distributed that it balances in the hand. Its action is controlled by a foot-switch, which enables the operator to start or stop or change the force of the blows while at work; it may also be instantly changed to a simple hand-pressure instrument, or be adjusted to strike single blows like the automatic.

In this mallet each impact of the hammer upon the tool-holder takes place before the electric circuit is broken, and consequently under full magnetic force. The blows are thus rendered very positive, whether light or heavy, and are struck in slow or rapid succession as the operator desires.

The complete apparatus as supplied by the manufacturers comprises the mallet, foot-switch, flexible wires, and a battery of dry cells. The street current or any form of battery may be used, but the style shown has the advantages of being inexpensive, clean, always ready for action, and requiring no attention beyond substituting new cells for the old when worn out.

Hand pressure. A force seldom employed successfully as the sole means of condensing and welding cohesive gold, yet a means resorted to in emergencies by the best operators for that pressure. To test the effectiveness of this force in the use of cohesive gold it is only necessary to place a few layers of the gold on a filling surface and then cover a small area of this surface with a plugger driven by a few smart blows of the hand mallet. It will readily be appreciated that the gold is not uniformly condensed; it might be possible to do it, but it would take more time and pains than is ordinarily given to it. Hand pressure is invariably used in starting cohesive gold fillings, and often in partly condensing or placing gold over margins, or in attaching small bits of gold to give cohesion to an over-worked surface, or a surface which for any cause has lost its cohesion.

Dr. Ottolengui says, "The greatest good gained by hand pressure is that the gold remains more cohesive under this method than in connection with any other." The fact is that gold possesses a certain amount of cohesion which can be satisfied and exhausted by any force which is exerted in excess of the amount required to establish a perfect union between its particles, and a surface of cohesive gold may be deprived of the quality of cohesion by the excessive use of a hand plugger as surely as by malleting; but it is not done, it cannot be done, in the same time, and therefore is not so likely to be done. It is important, then, that everyone in the use of cohesive gold should recognize the danger of over-condensation or working the cohesion out of the surface of a growing filling, whatever the force employed.

The method suggested by Dr. Ottolengui of overcoming this difficulty by the use of hand pressure is a good one; indentations, however, should be made previously in the surface of the filling with a sharp excavator, both for the purpose of exposing a new surface and for mechanical assistance in obtaining unions.

II. FORCES EMPLOYED IN INTRODUCING AND CONDENSING NON-COHESIVE GOLD.

Here hand pressure finds its most continuous usefulness. The method of working this material is so distinctly different from that employed with cohesive gold that a familiarity with the use of the latter is of little, if any, advantage in handling the former; indeed, it seems more frequently a positive disadvantage to have the materials associated in the mind of the student with any view of similarity of methods. With cohesive gold the force employed must be limited

to the surface and is intended to affect the latest layer of gold, while in the use of non-cohesive gold the force employed is expected to affect the whole or a large part of the gold already introduced. For this purpose, the sharp, quiet blow of the mallet is not well suited; and the more nearly ideal the mallet is for cohesive gold, the less it seems suited to the working of non-cohesive. For instance, the electric mallet may be considered an ideal force for condensing cohesive gold, but is comparatively useless in the manipulation of non-cohesive, except possibly in developing a surface hardness by friction—a matter of much importance in handling this material. On the other hand, the automatic, having a more penetrating blow, is not considered among the best instruments for cohesive gold, but is by many preferred to all others when non-cohesive gold is to be malleted.

Hand pressure was for a long time practically the only force employed in dental operations, and but for the introduction of cohesive gold would have retained its position. The wedging with irregular masses, the carrying of these masses before the instrument, placing them in position where they are themselves wedged against, piercing the partially condensed mass, or coaxing an instrument down through the center or side of a large bulk of gold—these are steps not to be accomplished by a few light surface blows, but by continuous insinuating pressure.

As in the use of mallets with cohesive gold, so in using hand pressure with non-cohesive gold, there are certain little refinements of manipulation which cannot be overlooked. In considering these it is desirable to recall the principles involved in the use of this material: First, the separate particles introduced never become more than mechanically united; consequently they must be so placed that well-directed pressure will tend to drive them closer together. The space thus made must be filled by additional particles, whose office it is to key those first introduced into position and hold them there. This system of wedging is the foundation of the successful management of non-cohesive gold. The tactful movements made in carrying to place and seating in the angles of the cavity the first particles are to be accomplished without greatly condensing these particles. When, however, the instrument is driven between the portions to produce space for more, the lateral condensation is to be accomplished by tilting the instrument in every direction and enlarging the opening, into which more gold is to be forced. This wedging with instruments and filling in with gold is continued until it is no longer possible to penetrate the mass. In carrying strips of the material before the instrument a final, slight lateral movement is made to disengage the instrument from the gold and assist in condensation. Sometimes it is only necessary to give a slight rotary movement to the hand; indeed, with those experienced in hand-pressure methods this movement seems always to follow direct pressure and to precede the removal of the instrument.

The points to be used in manipulating non-cohesive gold. As a rule, the point is much larger than would be considered appropriate in working cohesive gold; the serrations are deeper, and the general form is wedge-shaped. No very great variety is necessary, though the general rule of nice adjustment between instrument, gold, and cavity must obtain here as elsewhere.

The handle of the instrument should be of such size as to be grasped in the closed hand without fatiguing the fingers, and should be of wood or ivory, the steel instruments of proper size being too heavy. The handles of instruments at the depots are much too small; a compromise between these and the average elevator handle would be about right, with the terminal point the largest, as in the elevator handle.

URATIC DEPOSITS UPON THE ROOTS OF TEETH.

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(Read before the Susquehanna Dental Association, Harvey's Lake, Pa., May 27, 1905.)

THE subject to which I have the pleasure of asking your attention is one of considerable significance to the dental clinician, as it deals with a certain pathological aspect of that inflammatory disturbance of the pericemental membrane which often leads to exfoliation of the teeth. I must ask your indulgence in bringing before this body a question which during recent years has been made the topic of so many and not infrequently interesting and valuable communications; but, feeling that the point I wish particularly to discuss has a direct and important bearing upon the work of the dental practitioner, I venture almost unhesitatingly to place before this society the result of my studies upon the subject embodied in the title of this communication.

LITERATURE OF THE DISEASE.

The destructive inflammation of the pericementum generally known as "pyorrhea alveolaris" was studied as early as 1728 by Fauchard, who speaks of it as "scurvy of the gums."

Bourdet in 1757, in his book "Recherches et Observations sur Toutes les Parties de l'Art du Dentiste," describes the disease, saying that "The alveoli are susceptible to caries like the teeth themselves, but more rarely. The ordinary causes of this disease are: A scorbutic or venereal vice; deposits produced ordinarily by a damaged tooth, the vicious matter of which has remained for a long time in the region. The alveoli may likewise become the seat of destructive or consumptive processes, just as the roots of the first teeth or milk teeth. This is what may be observed when the roots become exposed during suppuration of the gums. This disease is very common. It is ordinarily caused by engorgement of the gums, where the blood is decomposed by stagnation; by an acrid and corrosive lymph which, soaking those parts, gradually undermines them; by the mere presence of tartar, or by the effect of an acrid and corrosive secretion which penetrates into the gums and up to the root of the tooth. These different causes bring about destruction according to the quality of the alveolus and the disposition of the subject. The alveoli and the intermediary septa which occupy the intervals between the roots undergo softening also at times, and become of a fleshy consistence. This is caused by the stagnation of the blood or of the serous lymph which infiltrates the gums. The abundance of these fluids remaining in the alveoli or in the surrounding parts very frequently produces this effect, and this is what causes the tooth to lose its supporting tissue."

The foregoing quotation is of interest, as it points to the fact that Bourdet surmised that causes other than salivary calculi could bring about in time the destruction of the pericementum.

Jourdain, another French investigator, wrote upon this question in 1784 and described the disease as a "conjoint suppuration of the alveoli and gums." Toirac in 1823 discussed the characteristic symptoms of this malady in a communication to one of the medical societies of Paris, and named it inter-alveolo-dental pyorrhea. Oudet in 1835 makes slight reference to the existence of such a disease, and Marchal de Calvi in 1861, after studying the disease, renamed it "expul-

sive gingivitis." It is interesting to note in this connection that every one of the early writers and many of the modern ones have considered the various names given to the disease by their predecessors either misleading or inappropriate, and in renaming it have so enlarged its terminology that one would be hardly justified under such circumstances to add one more term to the already overburdened list. To the term pyorrhea alveolaris the writer decidedly objects, as it implies a continuous flow of pus from the alveolus —a phenomenon which, as is well known, does not occur, or at least is not a constant symptomatic factor. The term which he ventures to suggest—pyo-destructive pericementitis—implies, in the writer's estimation, the concomitant conditions leading to the loss of the teeth, and is for this reason the one which he will adopt henceforth.

Among the modern writers it behooves us not to disregard the investigations of Magitot, Galippe, Riggs, Peirce, Darby, Black, Truman, Kirk, Andrews, and many others whose names are household words to all students of dental literature. The most important communication prior to the publication of the essay by Peirce and that by Kirk are doubtless that by J. H. P. Brown (*American Journal of Dental Science,* vol. iv, 1870), and that by Magitot, published in 1873. The latter investigator studied the disease with the accuracy of the scientist and accomplished such results as were then possible with the meager knowledge at command concerning the chemistry of the human body. He was, so far as we are aware, among the first writers to consider the nutritional factor as having a bearing upon the causation of the disease, and while he had frequently observed what he designated as alveolo-dental osteo-periostitis in patients of the hyperacid diathesis, he considered the fact as "accidental rather than causative."

Since the publication of Magitot's essay several writers and investigators have attributed to the constitutional factor an important rôle in the pathology of that disease of the alveolus and pericemental membrane which we have grown into the habit, good or bad, of designating as pyorrhea alveolaris.

In 1877 Dr. F. H. Rehwinkel (report of the Committee on Pathology and Surgery, *Trans. American Dental Association,* 1877, page 96) "entered his protest against the theory of the local origin of the disease, and endeavored to prove that it not only existed independent of foreign deposits and was dependent on more than merely local causes, but that it is hardly a constitutional disease." Dr. L. O. Ingersoll in 1881, in a paper published in the *Ohio Journal of Dental Science,* called attention to the blood-serum origin of the deposits upon the roots of teeth, which he designated as sanguinary calculus. These deposits he considered as originating from a source other than the saliva, his supposition being that they were derived entirely from the blood, and in consequence were the result rather than the origin of the inflammation. The term "phagedenic pericementitis" was employed by Black to designate a disease distinct from that type of pericemental inflammation beginning at the gum margin and due to the deposition of salivary calculi upon the crowns and part of the roots of teeth. He considers it a purely local disease, "not dependent upon any poison circulating in the blood of the patient or upon any systemic disorder." Professor Black, unless he has modified his views since the publication of his important work on "Diseases of the Peridental Membrane" (part iv, vol. i "American System of Dentistry") does not connect in any way whatever the gouty or rheumatic diathesis with the causation of pyo-destructive pericementitis.

Professor Peirce of Philadelphia, in a paper printed at page 1 of the January 1894 issue of the *International Dental Journal,* described the constitutional type of pyorrhea alveolaris, and showed almost conclusively that it is a local manifestation of the gouty state. He recognizes two distinct types of the disease. The origin of the deposits in the one form he attributes to the saliva, and in the other form to the blood. The first he designated as ptyalogenic calcic pericementitis

and the latter as hematogenic calcic pericementitis, "a term expressive of the idea that in its origin it is constitutional, central, and associated with some modification of the normal composition of the blood-plasma." The recently published work of Michaels of Paris and Kirk of Philadelphia has thrown considerable light upon this perhaps the most complicated problem in the domain of special dental pathology. It is only through their studies and investigations that the writer has been enabled to prepare this communication.

DISEASES OF MALNUTRITION.

Diseases of malnutrition may be classified into two distinct groups—those due to insufficient oxidation and those due to excessive oxidation. This classification, introduced by Gautrelet, has been adopted by Kirk and Michaels. The hyperacid diathesis, or the diathesis of insufficient oxidation, is characterized by the presence within the fluids of the body of waste products, acid in character, due principally to an excess of nitrogenous principles in the organism. The excess of nitrogen in the body, as above stated, is converted eventually into uric acid, which having a great affinity for the bases sodium and potassium combines with them, with the result that both sodium and potassium urate circulate freely through perhaps every organ and tissue of the body.

The hypoacid diathesis is the diathesis of excessive oxidation. Michaels tells us that in this particular diathesis the oxidations are overactive and the hydrations superior to normal, hence there is a decrease of organic acidity and an increase of saline chlorids excreted by the economy. "Hypoacidity, according to Duclaux, favors chemical changes in the tissues. In the hypoacid diathesis all the oxidations are exaggerated." As the disturbances with which we are now concerned belong to the hyperacid diathesis, further reference to the opposite diathesis seems here unnecessary.

Kirk has pointed out, in his work on "Saliva as an Index to Faulty Metabolism," that in the acid diathesis "the intake of oxygen by the cell is apparently disproportionate to the pabulum that the cell is required to convert into its normal end-products, and as a consequence the ratio of carbon dioxid to oxygen in the blood becomes greater than normal. In ordinary circumstances the temporary increase in the ratio of carbon dioxid to oxygen in the blood is corrected by the action of the renal epithelium, in which the reaction occurs between the carbonic acid of the blood and its contained basic phosphates, as follows: $H_2CO_3 + HNa_2PO_4 = HNaCO_3 + H_2NaPO_4$. The action of the carbonic acid upon the alkaline sodium phosphate results in the formation of acid sodium phosphate, which is eliminated by the kidneys, and of sodium bicarbonate, which is returned to the blood, the result being that the alkalescence of the blood-plasma is maintained at the normal point. The same action upon the neutral calcium phosphate results in the formation of acid calcium phosphate and calcium bicarbonate." Aside from the fact that this conversion of basic salts into acid salts and carbonates and the elimination of the acid elements through epiblastic structures explains to a degree the etiology of certain cases of erosion, it is likewise of importance in this discussion, as the source of the bases sodium and calcium —which enter into combination with uric acid to form the sodium and calcium urates—is probably the sodium and calcium bicarbonates resulting from the action of carbonic acid upon the neutral phosphates.

RELATIVE ACIDITY OR ALKALINITY.

Owing to the alkalinity of the liquor sanguinis the urates are maintained in solution, and while, as such, they may cause considerable disturbance and pathologic changes, the paroxysmal stage in gout or rheumatism does not occur until these salts become precipitated upon or are adjacent to sensitive surfaces. It is a well-known fact that the articulations, the tendons and muscles—tissues which are kept constantly active—are the

parts most likely to become the seat of tophi. We know that urates are precipitated in the presence of an acid, or under conditions of marked decrease in alkalinity, and therefore must conclude that in the gouty diathesis uratic deposits are the immediate result of the formation of acid substances or of decreased alkalinity about the parts which become the seat of such deposits.

Scheele as early as 1776 had discovered the fact that urinary concretions are dissolved by alkalis and precipitated by acids.

From our physiological studies we are aware that under ordinary circumstances, *i.e.* rest and inactivity, the reaction of the tissues is alkaline, and that after prolonged activity the reaction changes into one of marked acidity. The explanation for this is to be found in the breaking down of the proteid elements during activity, producing lactic acid among other compounds. In the case of the fatigued muscle the acidity is due to the formation of sarco-lactic acid, but in the case of fibrous tissue, particularly the white fibrous variety, the acidity is probably due to the formation of the plain lactic acid. Collagen, the principal element in fibrous tissue, when hydrated is converted into gelatin, which upon further disintegration is found to be composed of proteids which may be detected by any one of the several proteic reactions known both to chemists and physiologists.

I wish here to emphasize the point that uratic salts cannot be deposited unless there be acidity present. They circulate in the blood by virtue of the alkaline nature of this fluid and are precipitated as soon as they come in contact with acids or with fluids of an acid reaction or with areas of lessened alkalinity.

The fact that in gout and rheumatism the deposits of uric acid are mainly upon surfaces which are frequently overworked proves the point that uratic deposits are preceded by the formation of acid compounds.

Ebstein believes that all uratic deposits are preceded by necrobiotic changes causing the formation of acid end-products, but as acidity may be formed in the tissues in the absence of necrobiotic changes we are inclined to question that view, especially in its bearing upon pyodestructive pericementitis. The frequency of gouty deposits upon the metatarso-phalangeal articulation of the great toe is, in the writer's opinion, due to the fact that in the act of walking a great proportion of the body's weight is thrown upon that part of the foot. The consequence of this strain results in the formation of acid substances which then render that particular region a suitable field for the formation of gouty deposits. That the deposits found upon the roots of teeth are of uratic nature is a matter beyond doubt. Several such deposits were chemically analyzed by Professors Congdon and Brubaker at the solicitation of Professor Peirce, and were found to be composed mainly of sodium urate, free uric acid, and calcium phosphate.

The point which may now be raised is this: How may we account in the gouty deposits for the presence of such a compound as calcium phosphate, which as we know is dissolved by acids and not thrown down by them? This is probably due, as has been pointed out by Kirk, to the fact that after the uric salts are precipitated they set up an irritation which leads to cell death, infection, and purulent inflammation, with the concomitant breaking down of the tissues. Pus, with extravasated serum and disorganized proteic elements, has a degree of alkalinity greater than that of the blood, and therefore causes the precipitation of phosphates upon a nucleus of uratic salts.

PREDISPOSING CAUSES.

In the case of teeth the seat of pyodestructive pericementitis the predisposing cause is very frequently a malocclusion which often is not observable. A slight deviation from the normal position which a given tooth should occupy in the arch is sufficient to cause that tooth to perform an amount of work greater than its own normal share should be. This leads to overactivity, excessive oxidation, decrease of alkalinity, and probably to the formation of lactic acid through the

breaking down of the complex proteic molecules of the pericemental membrane, and finally to the precipitation upon that area of the uratic salts held in solution in the blood by virtue of its alkalinity.

I consider that the first stage of pyo-destructive pericementitis is one of relative or actual acidity of a certain portion of the pericemental membrane. This is then followed by the precipitation of uric acid salts, which acting as an irritant convert that pericemental area into a suitable field for the development of pyogenic organisms. The deposited urates have created a *locus minoris resistentiæ* and together with pyogenic germs are responsible for the formation of pus, which, being of an alkalinity greater than that of the blood, causes a precipitation of the calcium phosphates that are frequently found to be a component of the gouty deposit.

If, as pointed out, the absence of acidity would preclude the possibility of uratic deposition upon the roots of teeth, and furthermore if acid production is dependent upon a condition of overactivity or fatigue, the rational consequence in cases of teeth the seat of pyo-destructive pericementitis is to place them at once in a condition of physiological rest. Teeth which are slightly loose should not only be secured to the neighboring healthy organs, but the latter should be so treated that pressure during mastication upon the diseased organs may be entirely relieved. If permitted to remain in their loosened condition the affected teeth will be subjected not only to the force of mastication, but also to an abnormal degree of irritation owing to the stress placed upon the pericemental fibers each time the tooth moves laterally and forward or backward. The conditions to be avoided are all those which would tend to the formation of areas of relative or actual acidity around the pericementum. The apical third of the root is, as a rule, the part upon which is felt with greater intensity the result of forces applied against the crown—a reason which explains the frequency of gouty deposits in the neighborhood of the apical region rather than in that of the cervical region.

Bibliography.

Black. Litch's American System of Dentistry.

Brubaker. Physiology.

Burchard. Dental Pathology and Therapeutics.

Endelman. "The Metabolic Factor in its Bearing upon Inflammatory Conditions of the Human Mouth."

Frey and Lemerle. Pathologie de la Bouche et des Dents.

Kirk. "The Predisposing Factor in Dental Caries."

———. "The Saliva as an Index of Faulty Metabolism."

Peirce. Kirk's American Text-book of Operative Dentistry.

Roscoe and Schorlemmer. Treatise on Chemistry.

Simon. Physiological Chemistry.

Ziegler. General Pathology.

SOME PROPERTIES OF PLASTER OF PARIS AND ITS COMPOUNDS.

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(Read before Section VIII, Fourth International Dental Congress, St. Louis, Mo., August 30, 1904.)

IN some form, plaster is the material upon which all dental substitutes are constructed; hence it is pertinent that the material and its peculiar properties should be well understood. I opine that most of our failures in prosthetic dentistry are due to a lack of knowledge of the materials we use and a comprehension of the underlying principles of manipulation; that is, they are not due to an insufficiency of material, but to lack of knowledge and dexterity.

Prof. C. J. Essig, in the "American Text-Book of Prosthetic Dentistry," states: "Plaster of Paris (calcium sulfate, $CaSO_4$) is prepared from a native calcium sulfate, containing two molecules water of crystallization ($CaSO_4 + 2H_2O$), called gypsum when found in opaque masses, alabaster when it presents a semi-opaque appearance, and selenite when it occurs in transparent prisms. The first is the common source of plaster of Paris. It is prepared by heating the mineral in an oven where the heat does not exceed 127° C. (261° F.), by which the water of crystallization is expelled. It is afterward reduced to a fine powder, and when mixed with water it solidifies after a short time from the re-formation of the same hydrate; but this effect does not happen if the gypsum has been overheated and its affinity for water destroyed. In setting there is always a slight evolution of heat and more or less expansion."

Gypsum is a more or less impure hydrated calcium sulfate, and the plaster produced from the rock of different sections of country will have different working qualities, and each be suitable for some special purpose; also the method of manufacture will produce certain properties; therefore it becomes necessary to know the nature of any brand of plaster before we can know whether it is or is not adapted to a specific use.

There are two properties of plaster of Paris to be considered in this paper—*expansion* and *compressibility*.

EXPANSION.

The expansion of plaster of Paris has been studied more or less thoroughly at different times for the past sixty years. Probably the most accurate investigation from a scientific standpoint has recently been made by Dr. Prothero of the Northwestern University Dental School, with a specially constructed micrometer. During the past two years various articles have appeared in the journals by Dr. Stewart J. Spence, detailing various experiments. The writer of this paper believes that some of the experiments were misleading and some of the doctor's deductions were incorrect.

I desire to state this proposition as a truism: That a material (such as plaster of Paris) must be judged by the results obtained when it is manipulated by the best known methods.

I assume that all accept the statement quoted from Professor Essig, that "Plaster expands more or less." Upon experiment it is found that there is much difference in the expansion of the various brands upon the market; also that the method of manipulation makes a marked difference. For scientific accuracy it is necessary to have an instrument that will measure one ten-thousandth of inch, but for practical purposes a very simple and inexpensive method will demonstrate what kind of plaster

will give practical results. I have adopted for this purpose a beaker of thirty-five to forty grams, or nearly one and one-half ounces capacity. It is slightly tapering and nearly one and one-half inches in diameter at the top. This beaker is thin, well-annealed glass, and is sufficiently strong to stand the slight expansion of some brands of plaster, when properly mixed. A plaster that expands somewhat more may make a single crack in the beaker in twenty to thirty minutes' time; while another may shiver the glass into many pieces in from five to ten minutes. I have used several dozens of these beakers in this manner and have not had one break after thirty minutes from the time of placing the plaster in the receptacle, yet at the time of writing this paper some of these beakers have been standing eight months.

A plaster when properly mixed may not fracture the glass, but will, if improperly handled, show marked expansion. There are two essential factors in mixing plaster: First, a definite ratio of plaster to water so as to produce the maximum strength without perceptible expansion. Second, excessive agitation in mixing the plaster causes expansion and reduces the strength; due to a disturbance of crystallization. I have found that while one plaster may require two measures of plaster to one of water to make a proper mix, another may require as much as three and one-fourth measures of plaster to one of water; also that plaster when freshly ground will require more water than when it has been standing exposed to the atmosphere.

Lineal expansion. The first test was made by filling a seven by three-fourths inch test tube, which gave a negative result; there being perceptible to the eye no cracks in the glass or bulging of the plaster at the open end of the tube. For the second experiment, I had made a frame for molding bars of plaster eighteen inches long; upon either end was securely fastened an end-piece one and one-half inches thick; a piece of one-fourth inch thick plate glass was placed upon the base between the end-pieces, and two sliding bars one-half inch thick were placed over the glass between the end-pieces, so that a bar of plaster one-half inch thick, and any width up to two and a half inches wide, could be molded. All the parts were kept thoroughly oiled to prevent adhesion of the plaster. It is reasonable to suppose that if there were any perceptible expansion of this eighteen-inch bar that it would show itself in the direction of least resistance and consequently would be bowed upward. The results were practically *nil,* so far as the eye could detect. I believe we are justified in concluding that if a plaster when properly manipulated will stand the test of the beaker and the eighteen-inch bar, that its expansion does not necessarily account for a misfit denture; but that the imperfect adaptation is due to an unsuitable plaster or faulty manipulation.

French's regular dental plaster was used for these experiments. This plaster is probably obtainable at all dental supply houses.

COMPRESSIBILITY.

The writer is not aware that special stress has ever been laid upon this property of plaster; but if so, this contribution is offered as corroborative testimony. The writer believes that this property of plaster accounts for more failures in prosthesis than all other causes, barring a lack of knowledge and manipulation.

The testing of this property of plaster has been done with a lever upon a freely sliding plunger one-half inch in diameter. The plaster was placed in the lower half of a vulcanite flask, as the unconfined plaster would crush and give no satisfactory test of compression. The first series of tests was with French's regular dental plaster, to determine the time at which it reached its greatest degree of hardness. The conclusions were, that with two measures of plaster to one of water, and with minimum stirring, the greatest resistance to pressure was reached between twenty and twenty-five minutes. The tests were carried through a period of twenty-two hours. Other brands of plaster varied very materially, some requiring between one and two hours.

The next series of tests was to determine the length of time during which compression took place. As near as the eye could determine the compression was complete in about five or ten seconds; fifteen minutes' application of a given pressure made no perceptible increase.

It was observed in another series of experiments that the compression increased much more rapidly than the force applied; thus seven hundred and fifty pounds made fully twice the compression produced by five hundred pounds; and the same was also true of a thousand pounds compared with the seven hundred and fifty pounds.

I find that French's regular dental plaster is practically non-expanding, is fine-grained, mixes smoothly, sets quickly, reaches its greatest hardness in about twenty-five minutes, shows but slight compression at two hundred and fifty pounds but excessive at one thousand pounds pressure—between five and six one-hundredths of an inch. Thus far the plasters I have examined show much more marked expansion and generally considerable less compressibility than French's.

The Spence plaster compound is a remarkable preparation. It requires a small quantity of water and much kneading. A suitable mix can be made with three to three and one-fourth measures of plaster to one of water, which will not break the glass beaker; but upon working in more compound some expansion will be developed. In thirty minutes the material will resist a greater force than French's regular dental plaster, but its maximum strength is not developed for about two hours, when one thousand pounds pressure will not make the impression that two hundred and fifty pounds will upon ordinary plaster. The material is hard to mix and is very coarse grained. I use it for making casts by lining the impression with a thin layer of regular dental plaster, and the Spence compound is packed into the soft plaster lining. By this means I obtain a cast that is smooth and dense upon its surface and has great strength. The compound is also most valuable for articulating casts, being very hard, strong, and sharp in outline.

Appreciation of the fact of compressibility of plaster is of great importance in vulcanite and celluloid work. When the prosthetist has obtained an accurately fitting base plate, and having proved the articulation by trying in the mouth, finds that in the finished denture the teeth are too long upon one side, or the plate warped out of shape, it does not imply expansion of plaster or shrinkage of plate material, but rather an excess of rubber or celluloid improperly placed, and undue pressure. If there was an expansion of plaster in the flask there would be a thinning of the plate, because the investment plaster would compress the wax form, while the trouble is a thickening of a portion or the whole of the plate. These statements are proved by the fact that a perfectly fitting denture can be produced of these materials. While it is true that all plaster expands and rubber contracts in the process of vulcanization, it is equally true that these inherent properties are so minute when the best materials and processes of manipulation are employed that they make no practical difference in the finished denture.

Unvulcanized rubber is an exceedingly tenacious material; it will flow under slight pressure if given time, but will resist a tremendous pressure momentarily. The flask is closed under screw pressure; probably one to three tons pressure is often applied.

In considering the power of the screw in the flask press, we must consult physics, which informs us that the screw is a wedge and lever, and the work is equal to the power multiplied by the circumference described by the power, multiplied by the pitch of the screw, less the friction of the screw. The very convenient press, No. 2 of the Buffalo Dental Mfg. Co., will serve us for illustration. The circumference is twenty-five (plus) inches, the pitch one-tenth of an inch; allowing one-fifth for friction we have each pound of power producing two hundred pounds of work; and when we consider the tremendous force so easily applied upon compressible plaster, we have

a sufficient explanation for all misfit vulcanite and celluloid dentures, provided a perfect plaster impression and cast were used.

CONCLUSION.

A perfect fitting vulcanite denture can be made from a properly prepared plaster cast, or, what is safer in the hands of most men, a Spence-compound cast with a plaster facing, attention being given to packing and vulcanizing.

The rubber should be placed according to the space to be filled. It is better not to use sufficient rubber to entirely fill the mold at first; but use the wet cloth to separate the case, and add the necessary amount of rubber for the second or even the third closing of the flask. The cloth separator can be used over a vulcanite base plate as well as over a plaster cast. The flask and contents must be well warmed and the pressure applied lightly and increased at intervals of a few seconds.

The vulcanization should be accomplished at a low temperature and given a long time.

We should study our failures, for by them much is to be learned.

DENTITION IN RELATION TO THE EXCESSIVE INFANT MORTALITY IN MANILA.

By LOUIS OTTOFY, D.D.S., Manila, P. I.

(Read before the Philippine Islands Medical Association, March 3, 1905.)

IN view of the extensive literature upon the subject of dentition, from the standpoint whether the process be a physiological or a pathological one, a normal or an abnormal one, it seems almost needless to present any arguments in this paper. However, as this phase of the theme has been the source of an extensive controversy, especially as viewed from the standpoint of the dental practitioner *contra* the medical practitioner, it may be proper to give a brief *résumé,* even though the subject itself be still in dispute.

The process of dentition is unquestionably a physiological and normal one, as much so as the development of the cerebrum, the liver, or any other organ or appendage, including the hair and nails. It differs, however, in some particulars, which even in the most acrid controversy on this subject I have seen nowhere mentioned. The eruption of the teeth and the teeth themselves have been likened to the processes of the growth of the hair and nails; indeed, as they spring from the same embryonic tissue they are of epidermal origin, differing, however, in the following essential points from any other developmental function, namely: (1) That all other organs of the body are and remain inclosed within a dermal or mucous covering from the time of birth until dissolution, the only protrusion through the integument being made prenatally by the hair and nails, and the only tissues which protrude subsequent to birth are the dental organs. (2) The hairs and nails are devoid of nerve filaments and may be cut or mutilated without causing pain, while on the other hand the teeth are sensitive organs—filaments of nerve fibers if not extending within the prisms of the enamel cells nevertheless conveying pain to the nerve centers if the teeth are cut or mutilated. Hence dentition is in the entire development and growth of the body a singular function, admittedly physiological and normal, and yet, by reason of the exceptional difference pointed out, more liable to be pathological or abnormal than any other physiological function of the body.

It is no wonder, therefore, that from

the times of Hippocrates, Galen, and Celsus to the present day, the views of the ablest savants whose names grace the annals of medicine have been recorded in medical literature on the subject of abnormal dentition, while far less interest has been evoked in the simultaneous development of other organs more important to the economy, but which as a rule are restrained within physiological limits. The index-catalogue of the library of the Surgeon-General's office contains no less than four hundred and twenty references to pamphlets, articles, and papers relating to dentition, in main to its pathology. It is therefore impossible to deny, whatever the cause may be, that dentition is frequently at variance with physiological laws. More or less importance is attached to this subject by all authorities on pediatrics.

DENTITION IN THE TROPICS.

I have given the subject of dentition in the tropics, as differing from the same process in temperate zones, some thought, for two years ago I examined the teeth of five hundred Filipino children in the public schools of this city, and while the examination was conducted for the purpose of determining the percentage of carious teeth, I noted the proneness to such an early eruption of the permanent teeth as to set at naught the generally accepted periods of this process. A year ago I established a free clinic for dental relief at St. Luke's Hospital in this city, but no infants were brought under my observation, and my conclusions are drawn from general observation and a study of the subject, on which dental and medical literature as relates to the tropics and to this race are silent.

As a basis for the consideration of the subject before you, I have taken the most recent reports of the Board of Health of Manila, for a continuous period of six months, the most recent period which at this time is available in detail and in printed form, namely, from May to October, 1904, inclusive, and have taken notice only of infants and of those which have a bearing from a dental standpoint. Americans, Europeans, Chinese, and others are excluded as not being typical either in numbers or normal proportion of the married state, and hence the disproportion of the birth- and death-rate. The treatment of the subject is therefore confined entirely to the native population. I further apprehend that the number of deaths reported is absolutely correct, as a certificate is essential prior to burial, while I also note by the report and recognize the difficulty in securing a complete record of the births which have actually taken place. It is possible, therefore, that the relative ratio of deaths is too large for the actual number of births; but that point is not of special import, amounting probably to a small percentage. That the ratio of infant mortality is admitted to be excessive is sufficient for the purposes of this paper. Children less than one month of age are omitted from consideration as well as those over one year of age, when the mortality seems to be materially decreasing. The report of the Bureau of Health shows for the six months named, the following:

May to October, 1904, inclusive.

Deaths—Filipinos:	
Before completing one month of age..	647
Approximate number of deaths during second and third month, probably not due to dental causes.....	302
Other causes	959
Four to twelve months of age, due to convulsions and eclampsia	1342
Total number of deaths.....	3250
Excess of births over deaths.....	608
Total number of births reported.....	3858

It will be noted that presuming the death-rate after the first month of life to be equally distributed over the remaining eleven months of the child's first year of life, 302 would have succumbed during the second and third months (probably below the actual figures), leaving 1342 or 44 per cent. of the entire death roll of one year and under in which dentition may have been one of the complicating causes of death, if not in many of them the principal one.

The exact period of dentition has not to my knowledge been observed or re-

corded in cases other than the Caucasian, nor in tropical countries. Manson,[20] Scheube,[25] and Däubler,[5] leading authorities on tropical diseases, make no reference to dentition whatever, neither is there any reference to the subject in recent periodical medical literature which is specially devoted to diseases of the tropics, [1, 18, 31, 32] nor indeed is there any agreement as to the definiteness of the period assigned for the eruption of the teeth; in temperate zones the extremes are: presence of teeth at birth and permanently edentulous mouths—instances of either being but rarely met with.

Wide latitude to the time of eruption is given by writers. For the purposes of this paper only the first year is taken into consideration. Smale and Colyer,[26] as well as Coleman,[4] Goddard,[15] Tomes,[34] and many others, credit the first year with the eruption of eight teeth, while Stellwagen[30] says that in the United States eruption is from seven to eight weeks earlier than in England, thus bringing from ten to twelve teeth within the first year. Warren,[37] Harris,[17] and others agree with this view, showing that in temperate zones, where maturity is slower, a child may erupt from eight to twelve teeth between the sixth and twelfth month. I am of the opinion that eruption commences much earlier in the tropics, and unfortunately at a time when the follicular development of the alimentary tract leaves it more likely to be affected reflexly by the disturbances caused when the eruptions are abnormally difficult. In other words, if the eruption of the teeth (not necessarily implying merely their protrusion through the mucous membrane) commences at two or three months of the child's life, by the close of the first year a child of the tropics may have been obliged to pass through a series of developmental processes which normally should take until the end of the eighteenth month, possibly the end of the second year. Crowding into the period of nine months (that is from the fourth to the twelfth inclusive) a series of processes which often under the most hygienic and intelligent care of the child is accompanied by more or less systemic disturbances, seems to me might account in a measure for the excessive mortality. Coleman[4] relates a case where eruption commenced at seven months and continued uninterruptedly in pairs and groups until the child succumbed simply from exhaustion. It should furthermore be remembered that normally there is a reasonable time elapsing between the periods of the eruption of the teeth, especially the canines and first and second molars, which erupt in groups of four at a time, as against incisors, which erupt in pairs. The rapid succession of one group upon another is never otherwise than deleterious on the entire system, especially on the intestinal tract directly and the nervous system reflexly. If it is then also borne in mind that vaccination increases the suffering incidental to dentition, and that syphilis (Burchard[3]) and struma (Smale and Colyer[26]) accelerate the eruption of the teeth, it may be seen that there is some ground for my view that the disturbances of dentition, often unrecognized on account of the absence of local symptoms, may bear an important part in the mortality of the native children of Manila. West[38] states that the eruption of the first molar group gives more trouble than the canine group. Normally the first molars are due about the fourteenth month, and it would be interesting to know how much earlier the process initiates in the tropics.

PATHOLOGICAL CONDITIONS ATTRIBUTED TO DENTITION.

It has been clinically demonstrated that antiseptic treatment of the mouth during dentition exerted a favorable influence on the entire intestinal tract, indeed that in many instances it was the only remedy necessary to resort to. While the increased flow of saliva during dentition is perfectly normal, having a cooling effect, it is also true that the excessive hyperemia and irritation increases the flow until the result is detrimental to the general well being. An infant may be taken up when in this condition and if held face downward a steady thin stream of saliva will flow from the mouth, but when it is laid on its back or

partially on the side the flow is into the esophagus and the child swallows incredible amounts of saliva charged with organisms associated with intestinal fermentation (Miller[21]), some of them always present in the mouth, and, I apprehend, aggravated at this time in large numbers by climatic influences. Some of these germs are destroyed by the gastric juice while others are carried into the intestines, where they produce fermentation leading to further complications.

Treating this subject from a dental standpoint has led me to draw special attention to these points only, but I am not unmindful of the fact that there are many other vital influences to which the excessive mortality may be ascribed, such as improper feeding, improper clothing, lack of hygienic precautions, and possibly a score of other causes which will readily occur to the members of this body. But it is my opinion that while each of them is certainly important, probably no single cause is of greater importance than dentition. On the point just mentioned, especially in the view that the digestive, respiratory, and nervous systems are primarily influenced, and seriously so, by dentition, authorities though differing on the degree of influence are nevertheless almost a unit. Harris[17] attributes convulsions directly to dentition; so does Goddard,[15] White,[39] Burchard,[3] and others. Tomes[34] states that while disorders may be due to other causes, they may also be influenced by the eruption of the teeth. By some of the writers quoted, and by others, the following may be considered sequelæ to disturbed dentition: So-called "teething-convulsions" (when a number erupt at the same time), convulsions, coma, reflex disorders of the nervous system of an alarming character, intestinal disturbances, herpetic, vesicular, and papular eruptions of the skin, laryngeal cough, clonic convulsions, and symptomatic eclampsia. Portal[23] claims that epileptiform convulsions depending on the eruption of the teeth are by no means uncommon, and mentions a case in which the patient was relieved by lancing when in a state ofcollapse. Tordens and Henoch[6a] attributed spasmus nutans, or *tic de salaam,* to pathological dentition. Brown-Sequard[2] noted in a case of paraplegia reflex connection with the eruption of the teeth; Fliess,[13] paralysis; Brubaker, tetanus and aural troubles; Esquival, in lymphatic and nervous temperaments, insanity; Samelsohn, direct and secondary affections of the eyes and the orbital territory; Dessau[11] points out the influence of rickets on the development of the teeth, while Reynolds[40] holds that "a rhachitical tendency is the predisposing cause of infantile convulsions, although an inflamed and tender gum may precipitate the paroxysm."

RELIEF: THE QUESTION OF LANCING.

Believing, therefore, that some relief may be given along these lines, I would suggest that some arrangements be made by the Board of Health of this city to secure such an end at first by the simplest and safest method, that of lancing, which is no doubt done in a measure at the present time. The literature on this point also, *pro* and *con.*, is profuse and not necessary to be entered into at length at this time. In a general way all authorities agree that when resorted to, it must be done intelligently, aseptically, and thoroughly. Few claim that harm has resulted, some doubt or are undecided as to the merits; principal among these is Forchheimer,[14] who severely condemns the practice of lancing and cites the record of twelve cases of death directly due to hemorrhage as the result of lancing.

Forchheimer's work is severely attacked editorially by Dr. E. C. Kirk, editor of the DENTAL COSMOS,[7] especially on the point of gum-lancing, and the inference is drawn that although the author is a teacher of clinical diseases of children and a noted exponent of pediatry, he is evidently unfamiliar with the subject of gum-lancing. This severe criticism of an authority brought forth a number of comments. Dr. Patterson[19] a London physician took the ground that inasmuch as all inflammation is due to infection by micro-organisms, no inflammation could result from dentition, as the integument is unbroken and germs

could not be introduced to the seat of supposed inflammation. This process of reasoning was aptly described as "fantastic mental gymnastics," and the argument and "entire article was critically and patiently demolished" by the venerable Prof. James Truman, editor of the *International Dental Journal*.[19] Prof. Horatio C. Wood[35] defended and advocated in strong terms gum-lancing, which brought forth a reply from Prof. Forchheimer[36] in which he admitted that only in one instance did he lance or scarify the gums of a child, and that his view of the worthlessness of the practice is based on observation solely. The criticism on Professor Forchheimer's reply is closed by the editor of the DENTAL COSMOS[8] in the following language:

> Why it is that a certain class of medical men will persist in ignoring the nervous relationships of the teeth, and the immense importance of their pathological significance when viewed as a part of the whole economy, and continue to regard them in about the same light as they do the hair and nails, is difficult to understand in view of the copious literature on the subject, replete with authentic reports of cases directly in evidence as to their special relation to problems of general pathology, not to mention the constantly occurring examples from a clinical standpoint in further illustration of this relationship that come under the care of the general practitioner, and which easily manifest their significance to the careful and competent diagnostician.
>
> When the writer of a book on diseases of the mouth in children poses as an authority on, among other things, the subject of pathological dentition, and then explicitly denies that the sensitive pulp is in a condition of irritation, that there is a morbid activity in dentition, that there is augmented vascular and nervous action, and that there is hyperemia sufficient or insufficient in these cases, we may be pardoned for questioning as to the probability of his having closely examined even so much as the one case for which he is on record as having scarified or lanced—it is not clear which—and whether his knowledge of the subject is not like his recorded result in this case—*nil.*

Another able writer, Dr. W. C. Barrett,[10] subsequent to this attacked the subject, endeavoring to prove that the eruption of the teeth being a physiological process cannot be considered in a serious light. While admitting that a large number of children die from digestive diseases he denies that dental irritation has any measure of bearing upon the mortality; he admits that the retardation of the teeth will cause nervous disturbances. The radical view assumed by this writer is shown by his statement that he believes that the "miraculous recoveries from spasms and convulsions are mostly hallucinations and inventions."

But the preponderance of authoritative weight is in favor of the operation. Stevenson Smith[28] mentions two striking cases of immediate relief from convulsions, and so do many others. Tomes,[34] who treats the subject with thoroughness and conservatism, sums up the general opinion on this subject in the following words: "There are cases in which this simple operation will either mitigate or entirely remove most alarming symptoms." Harris,[17] Goddard,[15] Parreidt,[22] Burchard,[3] Warren,[37] Smale and Colyer,[26] Gorgas,[16] Starr,[29] and many others are advocates of judicious lancing, properly performed. Butler[9] takes the view that many have been advocates of the two extreme points, and that within reason the operation is of great benefit. He cites J. Lewis Smith's able work on "Diseases of Infancy and Childhood," Hunter's writings on "The Teeth and their Disorders Arising from Painful Evolution," and others, all of whom after careful study of the subject believe in the efficacy of the operation. Eustace Smith[27] recognizes the correlation between dental processes and disturbances of the digestive apparatus. Dr. Berg says that "Those who believe that dentition cannot be productive of any serious pathological disturbances are of right in the minority. When it is proved that such physiological processes as puberty and the cessation of the menstrual flow are never productive of serious morbid states, then we shall give credence to such a view. For the present it is emphatically the opinion of the vast majority of authorities that the teeth are frequently the only assignable cause of some of the disturbances oc-

curring during the dentitional period." Much misapprehension on the entire subject is evidently due to the fact that frequently the most serious cases are devoid of all local disturbance. Kirk[6b] calls attention to this fact, explaining that under these circumstances the pressure may be on the formative tissues below. Thrasher [10, 33] states that among the barbarous and wild animals dentition is usually normal, while the young of beasts confined in cages rarely survive the period of dentition. He believes that in this age of civilized refinement abnormal dentition is the rule. He further points out the various complications which arise in connection with abnormal dentition. Rotch,[24] in his complete and able work on "Pediatrics," denies that any serious consequences arise from dentition, but states that from the fourth or fifth month until the completion of dentition various nervous disturbances are so closely associated with dentition that in this sense dentition may be responsible for some disturbances. He holds that lancing should be resorted to under exceptional circumstances, admits that immediate relief follows, and then reverts to the statement that it is seldom necessary. For a better understanding it may be apropos to quote Kirk[7] again, on a point which it might be well for the members of both professions to understand and heed. He says: "Between medicine and dentistry there has always existed a certain territory, so to speak, which has been regarded by both as common ground; and each has claimed it as a legitimate field of practice and research. The two departments naturally meet and merge at certain points; each views the field from the stand of a special culture which in any given case is brought to bear upon it with the object of securing successful results in practice."

The most recent reference to this subject was in October last,[12] wherein reference is made to the fact that the editor of *l'Odontologie* quotes from an editorial in the *Journal des Praticiens,* where it is stated that "those accidents which are occasionally observed in connection with the eruption of the teeth are signs of local nervous irritation, and that such symptoms as salivation, redness of the gum, restlessness, and insomnia are corroborative signs; that parents occasionally request the attending physician to lance the gum, and that this kind of intervention is not only useless but at times detrimental." The editor of the DENTAL COSMOS makes the following comments on these views of a medical writer, as indorsed by the leading dental journal of Paris:

To anyone having had any experience in the care of infants' mouths the latter statement must certainly appear as both unfounded and incorrect. Coming from a medical writer, we should have tried to overlook its fallacy, being by this time familiar with the trend of thought of a number of physicians on this question of vital importance to infants, but as his opinion appears to be indorsed by the editor of a dental publication we cannot for a moment consider it right or just to refrain from expressing our views, which, by the way, are the result of both pathological observations and actual clinical experience.

The main cause of the number of complicated systemic disturbances concomitant to difficult dentition lies in the undue degree of pressure not upon the covering gingival tissue but against the unprotected and highly sensitive pulp. The pain and irritation which is thus established gives rise to nervous disturbances which in turn lower the vital resistance of the infant, thus predisposing it to a number of diseases of infectious character. It is in this way that we can account for the serious digestive troubles which almost always accompany the difficult cutting of the temporary teeth.

The writer is aware of many cases in which infants were almost instantaneously relieved through gum-lancing, and is fully in accord with the method advocated by progressive pediatrists to the effect that the gum should be lanced as soon as signs of local irritation appear. His experience is confirmed by that of many other dental practitioners who have successfully treated infantile disturbances due to difficult dentition by the lancing of the gingival region covering the enclosed teeth.

The parallel between the physician who refuses to recognize the necessity of lancing the gum in these cases and the dentist who administers chloroform for the extraction of a tooth is complete.

At birth, calcification of the deciduous teeth has so far progressed that almost

the entire crowns of the central and lateral incisors, nearly one-half of the crowns of the canines and one-third of the first and second molars is complete, and eruption of any of them may take place at any time subsequent to birth. It would be interesting to know whether the information may be secured by post-mortem examinations, to show if the process is more rapid in the tropics or not; such information would materially enrich the field of dental embryology, and the knowledge thus gained made available for the preservation of the lives of human beings yet unborn. The bodies of the stillborn may be available for this purpose.

SUGGESTIONS FOR MANILA.

I suggest the following method of procedure for the city of Manila:

(1) That cards be printed in Spanish, Tagalog, or any other dialect, setting forth the fact to parents that the first year in the lives of their offspring has been proved to be the most critical period. Such cards to contain advice as to feeding, clothing, teething, etc., and briefly the principal symptoms of abnormal teething—all in simple, untechnical langauge; further, the address of one of the sanitary stations of the Board of Health where the infants may be taken between the hours of eight and nine any day of the year for gratuitous attendance; also stating the office and home addresses of a number of dentists who will endeavor to give relief at any time, day or night, on the same basis.

(2) The card should be given to the parents at the time the birth is registered, with instruction to nail it up in the home, or what would be better, let the same be firmly attached to the walls of the sleeping-room of every native family where there is known to be an infant, the same to be done by some representative of the Board of Health.

(3) I am confident that seven dental practitioners can be found in Manila each of whom will give one hour per week throughout the year, gratis, for this purpose, and who will further consent to render services in like manner in urgent cases at all times, day or night.

Such effort could not result otherwise than in benefit to humanity.

BIBLIOGRAPHY.

1. *Archiv. für Schiffs- und Tropenhygiene*, 1903, 1904.
2. BROWN-SEQUARD. *Lancet*, Feb. 28, 1860.
3. BURCHARD. Dental Pathology and Therapeutics, 1898.
4. COLEMAN. Dental Surgery.
5. DÄUBLER. Die Grundzüge der Tropenhygiene, 1903.
6. (a) DENTAL COSMOS, Oct. 1889.—(b) *ibid.*, April 1890.
7. DENTAL COSMOS, June 1902.
8. *Ibid.*, Jan. 1893.
9. *Ibid.*, Dec. 1893.
10. *Ibid.*, March 1894.
11. *Ibid.*, March 1897.
12. *Ibid.*, Oct. 1904.
13. FLIESS. *Journal for Sick Children.*
14. FORCHHEIMER. Diseases of the Mouth in Children, 1892.
15. GODDARD. American Text-Book of Operative Dentistry, 1900.
16. GORGAS. A Series of Questions and Answers for Dental Students, 1892.
17. HARRIS. Principles and Practice of Dentistry, 1889.
18. *Indian Medical Gazette*, 1904.
19. *International Dental Journal*, Dec. 1892.
20. MANSON. Tropical Diseases, 1900.
21. MILLER. Micro-organisms of the Human Mouth, 1890.
22. PARREIDT. Compendium of Dentistry. Translated by Louis Ottofy, 1889.
23. PORTAL. Observations sur l'Epilepsie.
24. ROTCH. Pediatrics, 1896.
25. SCHEUBE. Die Krankheiten der Warmen Länder, 1903.
26. SMALE and COLYER. Diseases and Injuries of the Teeth, 1893.
27. SMITH (EUSTACE). Wasting Diseases of Children.
28. SMITH (STEVENSON). *Edinburgh Obstetrical Society.*
29. STARR. Diseases of the Digestive Organs, 1886.
30. STELLWAGEN. American Edition of Coleman (4).
31. *The Indian Lancet*, 1904.
32. *The Journal of Tropical Medicine*, 1901, 1902, 1903, 1904.
33. THRASHER. *Journal of the American Medical Association*, reprinted (10).
34. TOMES. Dental Surgery, 1887.
35. *University Med. Magazine*, July 1892.
36. *Ibid.*, Dec. 1892.
37. WARREN. Dental Pathology and Medicine, 1893.
38. WEST. On some Nervous Diseases of Children.
39. WHITE. American System of Dentistry.
40. *Transactions of the World's Columbian Dental Congress*, 1893.

PROCEEDINGS OF SOCIETIES.

FOURTH INTERNATIONAL DENTAL CONGRESS, ST. LOUIS, MO., AUGUST 29 TO SEPTEMBER 3, 1904.

(Continued from page 852.)

SECTION VIII: Prosthesis.

Chairman—CHARLES R. TURNER, Philadelphia, Pa.
Secretary—H. W. CAMPBELL, Suffolk, Va.

FIRST DAY—TUESDAY, AUGUST 30.

The section was called to order at 2.30 P.M. by the chairman, Dr. Charles R. Turner. Dr. J. Q. Byram acted as secretary *pro tem.*

Dr. J. P. Gray, Nashville, Tenn., was called to the chair, and Dr. CHAS. R. TURNER delivered the following address:

CHAIRMAN'S ADDRESS.

We have assembled from the various parts of the world to participate in the work of the Fourth International Dental Congress, and the section whose duties we are called upon to begin this afternoon has for its especial consideration the subject of Dental Prosthesis.

As the wise men of the early civilizations of Egypt and Phœnicia visited far and wide to broaden and enlarge their knowledge by contact with men of other nations; as the Greek youth assembled in the market-place to learn the principles of argument and oratory from the lips of Demosthenes; as Paracelsus gathered from his travel the facts which he formulated into our first chemistry, so from time immemorial personal intercourse has been a fruitful means for the dissemination of learning. That they might counsel more closely together, by a process of easy evolution congregations of men have taken place in order that, in addition to the imparting of knowledge, theses might be debated and facts be established. Much wisdom has come from these deliberations. Modern scientific conventions have for their purpose the recording of observations, the deduction of principles from such records, the establishment of these conclusions by proof furnished again by the original facts. It is here that the earnest worker in pursuit of truth brings the findings of his careful search in contribution to his fellow-man; it is here that the painstaking toiler, following the single path of his own field of labor, is freed from the limitations of his scientific provincialism by the process of friendly criticism and discussion; it is here that the youth, by contact with such investigators, is inspired with enthusiasm to the undertaking of greater deeds, and it is here that he whom ability and experience have made a master of his craft comes to exhibit the fruits of his skill to his brethren whose activities have been directed along other lines.

To us in America it has seemed particularly fitting that the Louisiana Purchase Exposition should be the occasion of an international gathering in dentistry. In the words of our late lamented President McKinley, "Expositions are the timekeepers of progress," and no less is it true that a congress of its representatives from all portions of the world marks an epoch in the development of any science. It has been a hundred years since Thomas Jefferson secured

from Napoleon, the First Consul of the Republic of France, the tract of land whose acquisition the city of St. Louis is now celebrating. It has been more than a century since Lafayette's army came from that same country to battle in behalf of American liberty, and is it not an event of equal importance in the history of dentistry that at that time there arrived upon American soil practically the first dentists to come to this country? And have not the developments of these two contributions of France to the New World been parallel marvels of unusual wonder?

The portion of dentistry with which we shall have to do in this section is dental prosthesis in its broadest sense, and includes the replacement of any or all the tissues pertaining to the masticating apparatus. If we may believe that the date assigned is correct, the findings in Etruscan and Phœnician necropoles seem to show that prosthesis is as old as dentistry itself. Whether it be as crude as the use of a vegetable fiber blanched by mastication by the courtezans of the port of Athens in a vain attempt to lure the unwary by the borrowed integrity and whiteness of their dentures, or whether it be as unsatisfactory as the teeth with which the divine Cleopatra may have charmed Mark Antony (although she might only have been able to endure them when he was present), prosthesis, since its beginning, has endeavored to supply to frail humanity portions of tissues lost through the curse of disease or the ill fortunes of accident, in order that form might be preserved and function prolonged. One may hardly be so sanguine of the possibility of dental prophylaxis, of dental hygiene, or of dental surgery as to fear that the need for dental prosthesis may cease to exist. In spite of conservative dentistry, and in addition to its careful ministration, the field of prosthetic dentistry will continue to enlarge and develop. And along what line will its further evolution take place?

Thomas Huxley said that scientific knowledge differs from common knowledge only in its greater accuracy, and in our own particular field of human inquiry it is evident that the tendency of investigators will be along the line of exactness in their search for ultimate truths. There must be an improvement in our knowledge of physics and mechanics which shall permit the construction of artificial substitutes in such a manner that the present difficulties attending their use may be overcome. We must enlarge our acquaintance with form and color—the fundamentals which are necessary to an analysis of the requirements of our creations—so that the lost parts may be supplied by substitutes in such perfect harmony with their environment that they shall escape detection after careful inspection. We have room for improvement in the technique of present processes, and a fertile field for labor in the search for materials of greater cosmetic and mechanical possibilities. We may still strive to deserve that encomium which Dr. Oliver Wendell Holmes thirty years ago pronounced: "The dental profession has established and prolonged the reign of beauty; it has added to the charms of social intercourse, and lent perfection to the accents of eloquence; it has taken from old age its most unwelcome feature and lengthened enjoyable human life far beyond the limit of the years when the toothless and purblind patriarch might exclaim, 'I have no pleasure in them.'"

In thus formally opening Section VIII, I wish to make public my grateful thanks to the Committee of Organization which has seen fit to select me to preside at its meetings. I trust its sessions may result in substantially furthering the cause of its special sphere of labor, and I hope that any failure on my part to serve it wisely may be laid at the door of my inexperience rather than to the score of unwillingness.

Dr. Gray. The first item on our program for this afternoon is a paper by Calvin S. Case of Chicago, Ill., entitled "The Mechanical Treatment of Congenital Cleft Palate." I will ask Mons. B. Platschick of Paris, France, to occupy the chair during the reading of Dr. Case's paper.

[This paper will be printed in the September issue of the Cosmos.]

The next order of business was a paper by Dr. B. J. Cigrand, Chicago, Ill., entitled "Facial Guide Lines as Taught by Artists and Sculptors."

The paper was illustrated with fifty-six stereopticon views.

Dr. Turner here resumed the chair.

The next paper on the program was one by Dr. G. H. Wilson, Cleveland, Ohio, on the subject "Some Properties of Plaster of Paris and its Compounds."

[This paper is printed in full at page 940 of the present issue of the Cosmos.]

Discussion.

Dr. J. H. Prothero, Chicago, Ill. The principal subject of this paper and the one on which the essayist lays the most stress, namely, the compressibility of plaster, has been almost totally disregarded by many in practice. Its importance is unquestioned, as the evil results pointed out by him in denture construction are sure to occur if proper precautionary measures are not observed.

While aware of the fact that a large surplus of rubber under heavy, rapid pressure will distort the face of almost any ordinary plaster model or of the entire matrix in some cases, my own ability to lessen such occurrences by proper measures has led me to neglect investigations along this line for what appeared of more importance, namely, the expansion of plaster. In my capacity of teacher, however, I have laid considerable stress on the error resulting from compressibility, as all beginners unless forewarned are liable to meet with more or less difficulty. It has pleased as well as benefited me greatly to hear Dr. Wilson's ideas on this subject, as I am sure all those who have heard them have been, and I will therefore offer no criticism on this phase of the subject, except to state that his means of measuring the compressibility of plaster seem somewhat too crude to secure accurate comparative results.

Nothing impresses upon the mind more clearly the expansive, contractile, and compressible qualities of a material under like or unlike conditions than a record of such movements in fractions of an inch or millimeters.

In regard to the use of Dr. Spence's or some other hard plaster for the body of models, the idea appears to be a good one and will largely overcome the evil results caused by the careless packing of rubber, or faulty manipulation in closing flasks, which, as Dr. Wilson states, are common sources of error.

I will state here that I have been conducting a number of experiments lately with a combination of Portland cement and plaster of Paris. I am getting fairly good results and think will soon arrive at a point where I can tell what is the correct formula for a dental plaster, so that you can manufacture it yourself.

I must, however, take exception to Dr. Wilson's experiments on the expansion of plaster and to the deductions he draws from those experiments. In the first place, the use of the beaker—which is cracked when expansion passes beyond a certain limit and which maintains its integrity when under that limit—is too crude for practical purposes. Could the present accurate knowledge of the behavior of dental amalgam alloys have been determined, or could these alloys have been brought to their present almost perfect state without use of the amalgam micrometer? I am sure it would not have been possible. For years before Dr. Black took up the study of alloys, various men were engaged in filling cavities in ivory blocks, test tubes, and steel matrices with alloy, and testing microscopically whether shrinkage or expansion occurred. No accurate results, however, were arrived at until an accurate instrument was devised for recording any and all changes that might occur under varying conditions. In the amalgam tests the object was to find a material which, in addition to other necessary qualities, would neither expand nor contract. So in the study of the physical properties of plaster, we wish to discover some mode of treatment of the material or method of manipulation that will control expansion and contraction, and this

can only be done by careful and accurate experiments with suitable instruments. Therefore, I feel justified in stating that the tests on expansion, as recorded by Dr. Wilson, are inaccurate and not to be compared with his tests on the compressibility of plaster. The essayist states that he finds French's regular dental plaster non-expanding, fine-grained, mixes smoothly, sets quickly, and reaches its greatest hardness in twenty-five minutes. From my own experience as well as experiments with this brand of plaster I can say that it expands fully as much as ordinary plaster unless precautions are taken to obviate this movement. All plasters expand to a greater or less extent. The degree of expansion depends largely upon the manner of manipulation as well as upon the proportions in which the plaster and water are mixed.

A mixture of French's dental plaster manipulated in the ordinary way and of the width of an ordinary impression, expands about sixty ten-thousandths of an inch in twenty minutes. The amount of expansion noted is sufficient to bulge an ordinary impression upward in the palatal portion to a very noticeable extent, thereby producing an incorrect copy of the mouth. A model poured into such an impression under similar circumstances will also be distorted in like manner. A denture constructed over such a model regardless of its density and resistance to compression, even though the manipulative steps were accurately carried out, would result in a misfit, therefore it appears to me very important that the expansive property of plaster should be overcome if possible, or at least reduced to the minimum to obviate error in the initial steps of dental construction.

Dr. Wilson says, "A plaster, when properly mixed, may not fracture the glass, but will, if improperly handled, show marked expansion." He further says, "There are two essential factors in mixing plaster. First, a definite ratio of plaster to water, so as to produce the maximum strength without perceptible expansion. Second, excessive agitation in mixing the plaster causes expansion and reduces the strength due to a disturbance of crystallization.

"I have found that while one plaster may require two measures of plaster to one of water to make a proper mix, another may require as much as three and one-fourth measures of plaster to one of water."

These statements are contradictory from the fact that in the first instance a definite ratio of plaster and water are recommended, and in the second instance the statement is made that various plasters require different quantities of water.

I agree with the essayist that the plaster and water should be mixed in definite proportions to secure the best results, and following out this idea I conducted many experiments to determine the proper quantity of each.

The following proportions were found to give the most uniform results:

Plaster,	gr. lv;
Water,	40 cc.;
Sulfate of potash,	gr. v.

Very slight agitation.

The sulfate of potash is used to control expansion and should be dissolved in the water previous to sifting in the plaster.

Dr. Wilson. In the experiments conducted by me, I placed in a triangular receptacle 6 inches long a mix of French's dental paste mixed in the ordinary manner. Placed in that, it would expand ten one-thousandths in twenty-five minutes and in the second expansion not less than ten one-hundredths. Now, as compared with conditions in which it has not been used, I am unable to state. I know this, we have secured excellent results with sulfid potassium when incorporated with water in the fitting of dentures, but when the rubber is placed in the flask there is a certain deterioration of the face of the model and perhaps of the entire matrix. I have models showing expansion of at least one-tenth mm.

Dr. B. J. Cigrand, Chicago, Ill. I rather agree with Dr. Prothero that the beaker is not as accurate a measurement as would be the meter, for the simple reason that the glass is largely affected

by the temperature of the plaster poured into it.

Dr. Wilson. It is the same mix.

Dr. Cigrand. But you cannot tell how absolutely alike were the beakers—you cannot tell that. The thin one would be the first one to fracture. I believe the micrometer would be the better way of measuring it.

Another point Dr. Prothero brought out, which I appreciate very much, that of the change in the mouth and in the tray, and third in the model, and possibly there is a fourth.

This is a matter we ought to be very much interested in, because many a plate which has been carefully constructed has not been entirely satisfactory for this very reason.

Dr. Wilson (closing the discussion). As far as my experience with the beakers was concerned, they were not designed to be of scientific accuracy. Dr. Prothero has gone into that in detail. My object in undertaking this work was to make a simple test of the plaster we are using, because I know many men have the habit of purchasing builder's plaster; that expands far more than the French regular dental plaster, although much harder.

How many students or practitioners can detect a ten-thousandth part of an inch. What difference does a ten thousandth or two ten-thousandths of an inch make in an artificial denture?

Dr. Prothero compares the amalgam with the plaster experiments. In the case of amalgam we must fill cavities properly to keep out microbes: we are not trying to keep out microbes. With plaster the case is different. We do not need so close an adaptation, but we do not want differences of one-quarter, one-eighth, or one-sixteenth of an inch.

I say that the ordinary plaster can be worked in such a way that it will give good results; but if we do not work it properly we do not get good results.

Dr. Prothero criticizes the paper upon the point of the ratio of plaster to that of water. He states that there is a given ratio. The given ratio in the case of French regular dental plaster is two measures of plaster to one of water. I will state that it will be found that it requires one and three-quarters of plaster to one of water.

Another point brought up is that there might be a difference in the thickness of the glass. In this instance I performed this test with the idea that the one would break and the other would not; I used no care in the selection of the glasses.

The object of my work was to make a practical test. We cannot all have a micrometer—could not all afford it, but we will be glad to have Dr. Prothero do this work.

Dr. Prothero. I am now just as much in the dark as I have been before in regard to the correct method of manipulation so that the plaster will not expand, and I would be very much pleased to have Dr. Wilson enlighten me.

Dr. Wilson. I consider the essential point is to ascertain the proper measure of plaster, and to stir sufficiently with the proper amount of water. I would be pleased to have Dr. Prothero test this and see if it is not correct. I will say, in making these tests I mix a mass with very little stirring, and then stir in the rest until it begins to crystallize, because I consider the degree of stirring causes the difference in the expansion of the plaster, for the reason that it was the same mix of plaster, only the one portion was stirred longer than the other.

Dr. Prothero. Yes, I recognize the fact that non-stirring will greatly increase the rapidity with which it expands. I will say that I expect to have my micrometer here tomorrow, and I would like to have Dr. Wilson see it.

Second Day—Wednesday, August 31.

The session was called to order at 2.30 P.M. by the chairman, Dr. Chas. R. Turner.

The Chairman. I take pleasure in calling upon Dr. Reuben C. Brophy of Chicago, Ill., who will read the first paper on the program for this afternoon.

Dr. Brophy then read his paper, entitled "The Rationale of Materials Used in the Construction of Dental Base-Plates."

[This paper together with the ensuing discussion will be published in the forthcoming "Transactions of the Fourth International Dental Congress."]

The CHAIRMAN. Before announcing the next paper, I notice that Dr. Charles Godon of Paris, France, president of the International Dental Federation, is in the room, and I wish to invite him to occupy the chair as honorary president.

Dr. Godon took the chair.

Dr. CHARLES GODON, Paris, France. Mr. President, I thank you for the honor.

The CHAIRMAN. I have pleasure in stating that the next paper is a contribution from Germany, and will be presented by the author in person. I am pleased to introduce Zahnarzt Dr. HERRMANN RAUHE of Düsseldorf, Germany, who will read his paper entitled "A New Suction Chamber."

[This paper, together with the ensuing discussion, will be printed in the forthcoming "Transactions of the Fourth International Dental Congress."]

The CHAIRMAN. We have another paper on the program for this afternoon, the author of which is not here; as we shall be very much pressed for time I should be disposed to read this paper by title.

Dr. GOSLEE. I move that the next paper be read by title.

This motion being duly seconded was unanimously carried, and the secretary read the following paper by title—"Which is the Ideal Crown—the Banded or the Bandless Crown?" by EDWARD G. CHRISTIANSEN, Drammen, Norway.

[This paper will be printed in the forthcoming "Transactions of the Fourth International Dental Congress."]

The section adjourned until Thursday, September 1st, at 2.30 P.M.

THIRD DAY—THURSDAY, SEPTEMBER 1.

The section was called to order at 2.30 P.M., Dr. Chas. R. Turner, chairman, presiding.

The CHAIRMAN. I have great pleasure in announcing that the usual program for this afternoon has been slightly changed so that a paper may be presented by Dr. Ch. Godon of Paris, France, in behalf of his *confrère* Dr. LEON DELAIR, on "An Artificial Larynx and Glottis."

[This paper, together with the discussion which it elicited, will be published in the forthcoming "Transactions of the Fourth International Dental Congress."]

The CHAIRMAN. The next paper on the program for today is by Dr. Hart J. Goslee. Dr. Goslee needs no introduction. I have great pleasure in calling upon him to read his paper on "The Mechanical Requirements and Cosmetic Possibilities of Modern Artificial Crown Work."

Dr. HART J. GOSLEE, Chicago, Ill., then read the following paper:

THE MECHANICAL REQUIREMENTS AND COSMETIC POSSIBILITIES OF MODERN ARTIFICIAL CROWN WORK.

In view of the more or less exhaustive contributions to our periodical literature which have been published during the past ten or fifteen years relating especially to the methods of restoring the crowns of natural teeth, it would perhaps seem to the casual observer that the subject in general must have been so well covered as to almost preclude the further presentation of views possessing any features of intrinsic value.

And yet, notwithstanding the conspicuous evidence of the progress made in this particular field which is so forcibly manifested by the splendid character of much in our current literature, and by the class of operations now being performed as compared with similar efforts of even a decade ago, the field is in a measure so broad and so diversified as to doubtless always offer possibilities of still greater advancement.

Indeed, when opportunity for improvement in any line of human effort ceases, then progress ceases, and therefore, in consonance with common philosophy, since we cannot rest permanently at anchor on the turbulent waters of the sea of human activity, retrogression must otherwise be inevitable.

The practice of truly modern dentistry in its composite specialties, however,

offers an opportunity for combining *art and mechanics* which, while limited in scope, is yet of so high an order and of such a diversified range as to warrant the assertion that the millennium has by no means yet been reached.

Of the specialties which go to make up our young, vigorous, and useful profession, no individual one—unless perhaps it be that of orthodontia—affords greater or even equal opportunities for the closer blending of these two important phases of human endeavor—art and mechanics—or contributes so largely to the development of a higher conception of the possibilities incident to their combined application, than is afforded in the methods which pertain, from a mechanical aspect, to the preservation of the roots of teeth and to their more or less permanent restoration to a normal degree of usefulness; and, from a cosmetic aspect, to the close simulation of or improvement upon the natural organ to a degree such as to defy detection in the substitute.

While "dental" mechanics has perhaps not contributed much to the fundamental principles of this particular science upon which all of our efforts are so largely based, yet a review of the advent and development of artificial crown work in itself will afford convincing evidence that in the natural progress of the profession it has contributed liberally to the arts and to many of the other sciences of modern times, and that it has at least in no way retarded nor proved a barrier to the natural advancement of all mechanical pursuits.

Since it is the very highest achievement of true art to copy nature, we have contributed liberally thereto by the development of procedures which enable us in our particular field to so closely simulate nature in her perfections and imperfections as to be able to substitute the natural with the artificial in such manner as to preclude detection.

While I make the statement that we are now able to accomplish this in a large degree, yet I must also acknowledge with profound reluctance that many of us do not do so, and that still more do not even try. Hence, I find a logical excuse for this effort in the attempt to stimulate others to aid in the elevation of the profession in general, and of dental art and dental mechanics in particular, to a sphere beyond that of the mere artisan, and more in accord with the higher degree of art which modern possibilities offer.

Such possibilities, however, are not the product of the day, but are the outgrowth of a gradual process of development, and a knowledge of the various stages of this development should constitute a portion of the education of everyone whose ambition is to achieve results beyond the ordinary.

In reviewing the development of this particular class of work, it will be observed that the cosmetic requirements were early recognized by our progenitors, and that their primitive efforts were largely concentrated upon the production of a substitute for the natural crown which would, first of all, closely resemble it; and, secondly, be capable of more or less universal application.

To this quite laudable ambition may be attributed the advent of porcelain, and subsequently of porcelain crowns; but as the art side encompasses only one phase of the requirements, and as the efforts were for some little time directed mainly toward this phase, the more or less temporary nature of the results quite naturally caused an awakening to the fact that the very highest artistic achievement was practically but wasted energy, unless constructed with due observation of those aseptic requirements which afford comfort and immunity from subsequent disturbances, and with a further observation of the mechanical requirements which insure a high degree of permanence in the operation.

This demanded the adoption of procedures based more largely upon the fundamental principles of mechanics, and hence was recognized the inadequacy of the former crude methods of root-preparation and of crown-attachment.

The cosmetic possibilities were then for a time subordinated to the mechanical requirements, and soon the era of the glaring gold crown was upon us. While this

practice has reigned to a more or less flagrant extent ever since, yet, as the profession advanced, the desire for higher artistic attainment increased, and in proportion as this tendency advanced among the more conscientious members of the profession, so also did it develop among their patrons, until now the employment of the gold crown on any tooth within the range of immediate vision is generally considered an offense against the refinement and culture of the patient, and an acknowledgment that the professional and ethical standing of the dentist is not of the very highest order.

Since the application of gold crowns offers a useful and highly indestructible method of preserving the teeth, however, and since there are some teeth, of course, which are not within the range of immediate vision, the employment of such methods will doubtless always be often indicated. Indeed, when properly adapted to roots which have previously been placed in a condition favorable to permanent comfort and usefulness, and when the application is confined to such posterior teeth as are beyond the range of vision, there is no other method of procedure which offers so great a degree of general adaptability, and of opportunity for obtaining reasonably permanent results, as the gold crown.

In view of the combined requirements, however, the field of adaptability embraces but a small area of the normal denture, and hence we may ask how and by what method may the remaining teeth in the denture be restored and preserved in a manner which will conserve to the maximum degree of perfection in all of the requirements?

That the cosmetic requirements demand the employment of porcelain is acknowledged, and that the mechanical requirements also demand a pronounced degree of strength in the crown and of stability in the attachment is also conceded, and yet again how may the composite of these requirements be best obtained?

An effort in this direction was marked by the advent of the porcelain facing, and its use in combination with gold, and the so-called "Richmond" crown with its various modifications was suggested and is still much employed. While this general style of construction embraces advantageous features in line with both of the general classes of requirements, still it involves detail which is necessarily somewhat circuitous, and possesses disadvantageous features so pronounced as to preclude its universal employment.

While the mechanical requirements are perhaps adequately conserved in so far as attachment to and protection of the root is concerned, the particularly objectionable features are that a thin veneer of porcelain can never possess that degree of translucency necessary to closely resemble the natural teeth when it is placed in contact with a surface of metal; and that a maximum degree of strength in its attachment to the metal can scarcely be expected from the simple attachment afforded by the pins.

These very objectionable features, when combined with the necessarily circuitous detail incident to the construction of this style of crown, and when further supplemented by the apparently innate desire of an unfortunately large proportion of practitioners to avoid the expenditure of as much effort and energy as possible, soon led to the suggestion and manufacture of ready-made porcelain crowns.

The stupendous sales of some forms of this particular style of crown which the manufacturers have recorded each year since their introduction, silently attest to the willingness of a large proportion of the profession to use and of the manufacturers to supply and to create and increase the demands for those methods which offer only the advantage of simplicity in application.

In this particular connection, is the employment of any ready-made style of crown for immediate adjustment conceded to afford the same opportunity for obtaining a maximum degree of permanence incident to the preservation of the roots of teeth, as is offered by the crown which is skilfully constructed for the special case? Is it possible to secure as close an adaptation between the base

and periphery of the crown and root by grinding the one to fit the other, as is obtainable by the burnishing or swaging of a metal base? Is the joint secured by the former procedure as impervious to the penetration of the secretions of the mouth as is the joint which may be obtained by the latter? Do we not depend largely upon the closeness of this joint for permanence in the operation? and are the opportunities for the protection and preservation of the root as favorable by the former method as by the latter?

My answer to all of these manifestly logical queries is emphatically negative, and I can scarcely believe, in view of the present methods for obtaining a maximum of all of the combined requirements incident to the application of artificial crowns, that the continued more or less extensive employment of ready-made products is indicative of the progress which the profession is making.

Indeed, it occurs to me that the general use of ready-made crowns by the ambitious and conscientious practitioner of today is as deplorable a practice as the employment of the so-called "shotgun" prescription by the modern physician; and I believe that the sooner the progressive practitioner arrives at this conclusion, and abandons the use of all forms of ready-made crowns—except perhaps in rare instances—the sooner will he be adopting more conservative and reliable methods, putting forth better efforts, and conducing to more permanent results.

In order that we may more fully appreciate the possible logic of these conclusions, that such efforts may be made, and that such results may obtain from our efforts, it is necessary that we should first carefully consider and analyze the requirements of modern artificial crown work.

As applied particularly to the ten—or possibly twelve—anterior teeth, where the use of gold is contraindicated, these constitute in the composite, first, a degree of adaptability which will make the application more or less universal, and which will offer opportunity for the reasonably permanent protection and preservation of the root; and, second, the substitute must possess that degree of translucency which will impart a harmonious and life-like appearance, and thus enable it to closely simulate the natural teeth. Thus it will be observed that while each of these two classes is of equal importance with the other, one pertains only to the mechanical phase of the question, while the other applies more exclusively to the cosmetic side.

While it is true that one or two styles of ready-made porcelain crowns are so constructed as to make it possible to achieve cosmetic results in their use, it is also equally true that their employment in the usual manner of adjustment for which they are designed, does not in a similar manner conform to the mechanical requirements. Hence the principal advantage claimed for them, that of "simplicity of adaptation and attachment," can only be regarded as an affront to the ambition and skill of that class of practitioners who are diligently striving for the best rather than for the easiest methods. And, indeed, these are the practitioners who are doing the most to elevate the profession, and to make it possible for themselves as well as others to do better operations and in turn to procure better fees.

Because of their inherent cosmetic qualities, however, such crowns may be employed, but not in the simple and expeditious manner for which they were originally designed, because this adjustment does not insure the maximum degree of permanence which is demanded.

As pertains to the class of requirements which have been and are thus designated in the composite as being mechanical, and upon which depend the protection and preservation of the root, and consequently the permanence of the operation, I have already emphasized the importance of securing the very highest degree of accuracy in the adaptation of the crown, and asserted that this essential feature may be accomplished only by conforming a metal cap or base to the exposed end of the root.

Early recognition of this fact led to the construction of crowns with a metal base adapted directly to the end of the

root, and subsequently to the employment of a cap entirely encompassing a short projecting end. This procedure was advocated as a means of carrying the immediate joint between crown and root to a point where it would be less accessible to the secretions, and thus more immune to their deleterious action, as well as for the purpose of adding increased stability to the attachment between the two, and of insuring greater protection to the root.

The advisability of such a procedure has precipitated much vigorous discussion, and has always been more or less a debatable question, and the fact that it continues to be so regarded by many, probably accounts for the extensive use of ready-made crowns.

This question seems logically debatable on the ground that the presence of a band often detracts from the cosmetic appearance of the crown by being more or less conspicuous; and further, and more important, that it almost invariably becomes a source of irritation, inducing gingivitis and subsequent recession of the soft contiguous tissues, not infrequently to an injurious extent.

While some have contended that this condition when present is caused by an electro-chemical action induced by contact between the metal and the soft tissues, through the medium of the secretions, it is the belief of the large majority, and of myself, that such a theory is only hypothetical, and that the true cause of such manifestations may invariably be traced to mechanical irritation. It is my further belief, however, that when such conditions do present, the fault is not with the principle, but in its application.

Hence I maintain that if the periphery of the projecting end of the root is properly and skilfully prepared—a procedure, however, which is usually performed in the most flagrantly perfunctory manner —and then if a *narrow* band made of a gage of metal sufficiently heavy to retain its given shape under the stress of fitting is well and closely adapted to the sides of the root, and allowed to pass only a short but uniform distance within the free cervical margin upon all surfaces, so as to closely follow the cervical curvature of the gum and offer no impingement upon the peridental membrane, the presence of a band will offer *no* mechanical irritation, and the objections to this style of construction will thus be largely, if not entirely, removed.

In proportion, then, as these statements seem to be logical, the employment of a band in the manner indicated is practicable and warrantable, and in a large percentage of cases will afford a type of construction which will without question offer the most permanent results. Where it may not be so adapted, however, its employment is contraindicated, and the adaptation of a simple plate to the end of the root will doubtless offer the next best means of conserving this phase of the requirements.

In recapitulation, the requirements classed as mechanical, demand, first, the construction of a well-adapted base, and second, the possession of sufficient inherent strength to sustain the stress of mastication; and those classed as cosmetic demand the employment of porcelain in accordance with the indications mentioned.

With this conservative analysis of the respective requirements, let us now consider how they may be so combined as to be productive of the highest and most modern type of construction. These requirements may be obtained by the employment of such crowns as the Davis, Logan, and Justi designs, when the employment is made in conjunction with a base of either gold or platinum, or otherwise perfectly adapted, and such method of procedure is the only means by which reasonable permanence may be obtained in their use.

This may seem a somewhat radical statement, in view of the fact that such crowns, mounted without such an observation of the combined requirements, have been known to restore the function and usefulness of roots for almost a score of years.

It must be conceded, however, that such instances are the rare and extraordinary occurrences, not the average experience and observation of the general practitioner. Also, that the long-

est service has probably been with bicuspids, where the occlusion favors their retention, whereas with the six anterior teeth mastication provides a stress constantly tending toward their labial displacement. Furthermore, irrespective of how long such crowns, so mounted, may do service when they are finally lost through failure from whatever source, it will be observed that the root itself is usually beyond redemption. This is not true, however, of the root which has supported a crown having a well-adapted base, and when the removal of such crowns is for any reason demanded, the fact that the supporting root is usually found to be in a good state of preservation should serve to prove the logic of my contention.

Incident to the use of these crowns in the proper manner, however, and for other than temporary purposes, it may be said that the variety of molds and colors in which they are now manufactured offer favorable opportunities for a close simulation of the natural teeth. And yet, in justice to the varied requirements in this connection, their employment does not offer the same opportunity for selection, nor for a close adaptation of the peripheral outline of the crown to the base, which is afforded by the use of simple facings, for the reason that such crowns are made in a far more limited number of molds than are the ordinary facings. Neither can we as accurately secure the necessary circumferential approximation when compelled to use a ready-made porcelain substitute having the proportions of a complete crown.

For these reasons, then, it would seem that the combined mechanical and cosmetic requirements may be best obtained in the large proportion of cases by the employment of facings and the construction of modern porcelain crowns.

The advent and development of porcelain work; the recognition of its possibilities and limitations; the large range of adaptability of the compounds now prepared, and the improved facilities for their employment now at our command, make it possible for every progressive practitioner to achieve results which combine both of these general classes of requirements to the highest possible degree, and to an extent not to be attained by any other modes of procedure.

The special advantages to be obtained from the application of porcelain crowns lie in the artistic manner and facility with which the natural conditions and varying characteristics may be closely simulated, together with the increased possibilities for securing a degree of strength exceeding any other style of construction. For these highly important reasons I beg to submit that the construction and application of porcelain crowns is destined to become the universal, if not the exclusive, practice of the future, as applied to restoring the ten anterior teeth.

Discussion.

Dr. W. A. Capon, Philadelphia, Pa. There cannot be a difference of opinion as to the relative value of a crown with band or without, nor can there be a comparison between the metal and porcelain crown when used individually.

There are those who use ready-made crowns from choice, and there are others who use ready-made crowns from force of circumstances. To those using them from choice, I have nothing to say in their defense. There are others who use ready-made crowns because their patients will not allow them for financial reasons to perform the higher grade work. I allude to the hosts of dentists who cater to that class of patients who demand a lower grade of work. This applies to dentists who operate on people who work in mills or where time is not paid for according to its real value.

In making bands for crowns, of course that work has my undivided support because I do not think there are many here who have worked any longer than I have in that line. I am speaking of band crowns with porcelain attachment. It may not be just the same as the essayist has described, but there are other methods of great value, and I am only too glad to be able to support what he has said. The band crown is one that can never be done

away with, in spite of the many beautiful operations which have been done in the clinics today, where platinum has been done away with entirely. Much can be said in favor of platinum as a band. I advise it in my different visits to cities all over the country, because the irritation of the platinum band is very small, in fact almost *nil,* although there is tissue that will be disturbed by anything that may come in contact with it; but the platinum band, or iridio-platinum, which is the same or almost the same thing, has the advantage of stability and cannot be praised too highly.

I have a crown in my own mouth which has been there eleven years. There is not the slightest irritation of gum tissue, and there is no drawing back from the edges. If a band crown must be used in connection with solder work, I think the advice of all of us would be to use platinum as the first base, which will amply repay in after years, for there is very seldom recession. I have a thousand crowns in use today with platinum bands, and it is decidedly pleasant, and it makes me feel better to see the majority of these crowns free from any irritation in the use of platinum. I say, All hail! to platinum wherever it can be used. All colleges should teach such work in preference to the gold work. I believe in teaching students the work advocated by this essayist. The work should be compulsory, otherwise the student is not properly equipped for his work, nor is he able to compete with those who have this knowledge.

The future of porcelain and its many branches has never been outlined to such an extent as in these clinics within the past few days—all proving that the evolution of this branch of our art is most active.

Dr. E. Parmly Brown, New York, N. Y. Twenty years ago I introduced this porcelain work before the First District Dental Society, and the report was published in the Cosmos. I showed two or three models, all porcelain bridged and all porcelain crowned, and after reading my paper the wise men looked at each other and laughed a little; but they are not laughing now. They are coming round to find me. I got a little hysterical then, but upon second thought I said to myself, "You can't drive things into men's heads; it will not be twenty-five years before this system of mine will be right on deck."

Taking up Dr. Capon's remarks, there is only one thing I want to say in explanation in regard to platinum: They will be using platinum on the teeth of the angels of heaven—and no other metal.

I never put in one Richmond crown, nor a single gold band around any, except where I insert gold crowns on posterior teeth.

Dr. N. S. Jenkins, Dresden, Germany. It has come to be my experience that in the great majority of cases it is wholly unnecessary to have any band whatever, for the reason that after long-continued experiment I have reached what I believe to be an absolutely irresistible strength in the iridio-platinum pin, when of appropriate size and exactly fitted to the root. That strength is reached by a 20 per cent. alloy of iridium with platinum. Ten per cent. with platinum affords the most desirable alloy for caps and in the infrequent cases where bands or half-bands are indicated. But with a pin of 20 per cent. alloy—a pin which accurately fits a countersunk root to which a thin 10 per cent. iridio-platinum cap has been exactly fitted—a band is very seldom desirable.

Lastly, I would say that the making of an all-porcelain crown or an all-porcelain bridge is an operation which every dentist ought to make as his regular daily work, not as an exception but as the only thing which a civilized dentist should put in the mouth of a civilized patient.

Dr. R. Ottolengui, New York, N. Y. This paper is simply an appeal for ethical endeavor, and I cannot argue against that. It is an appeal for the standard that a man must do the best that is in him in every operation in crown and bridge work.

I will only make one additional remark, and that is the only point which the essayist has left out.

When we make a gold plate with porce-

lain attachments, we find the gold itself is not cleanly. The worst place is the crevice between the porcelain and the gold to which it is attached—and it is doing away with the space between the backing and the porcelain which is the most important feature of the all-porcelain crown, making it absolutely instead of only moderately hygienic.

Dr. R. L. Simpson, Richmond, Va. While sitting here the thought came to me that those whose patients have summer homes in the Adirondacks can well afford to use platinum and porcelain; but it is another matter to the practitioner who is giving his services to the mass of the American people—the great middle class who are only moderately able to pay for dental restorations of any kind. Can he in duty to himself and them take up this more artistic and more expensive work, and is it best for the patient from the standpoint of durability?

Porcelain and gold are used in an entirely different manner. With porcelain we have to do an immense amount of artistic guessing, for we do not know how much it is going to shrink in the baking, and we must add just exactly as much as is needed and no more; but those who use gold have a great deal more liberty and latitude to overcome defects. With gold we can copy nature's cusps perfectly, knowing the gold duplicate will neither shrink nor change its shape; whereas with the other material we must do all the carving, and have to guess at the size.

My efforts have been to perfect the prosthesis of gold and flatbacks and saddlebacks, making the gold stiff enough to stand the strain. You will find that porcelain workers use saddle bridges to add strength to their porcelain by bulk. So much bulk to gold is not needed, and self-cleansing bridges seem to be the best in my experience.

A great deal of discussion has taken place about the use of bands, or half-bands, or none at all, but the difficulty to my mind is that they are improperly made.

The only point I would leave with you in making gold-porcelain bridges is to so grind your facings that they will be supported both at the cutting edge and the cervix by a kind of cup, and not to depend on pins alone. Then add enough solder to make the bridge inflexible.

Dr. E. A. Bryant, Washington, D. C. I took great pleasure in listening to this paper. It pleases me equally as much if not more to see before us almost the entire foreign delegation to this congress listening to the subject and interested in the papers on prosthesis.

Some of the discussion in regard to the use of porcelain has gone a little bit farther than I think is entirely safe for the average man to attempt. My friend Dr. Brown who taught me in my school days, and who first reached out the hand of fellowship to me when I came to New York from the Rocky Mountains, when bringing out my system pertaining to gold bridge and crown work, has for twenty years at least confined his practice to porcelain work, and has attained that proficiency which gives him the ability to construct porcelain dentures strong enough to stand perhaps the greatest strain of mastication; but the point I wish to bring out, and which I have followed in my own practice entirely, is to attain a structure which under any condition can be repaired in every part, generally without removal from the mouth.

If a facing is broken from a porcelain bridge, it has to be removed in order to be repaired. In a great many instances, perhaps in a majority of the cases, the breakage of any portion of that bridge requires a removal and the making of a new bridge. That is not so in the use of gold bridges and replaceable facings or removable bridges.

I think, gentlemen, we should always put into a patient's mouth a denture as strong as can be made and as artistic as we can make it, to be followed by a method which the man himself is able to handle intelligently in all the phases of his work.

Dr. G. D. Sitherwood, Bloomington, Ill. I am an eclectic in practice, but rarely ever put on any sort of crown ex-

cept a porcelain crown. It takes no longer to make a porcelain crown than a gold one. It is merely a matter of practice. The smallest amount of metal consistent with strength—the narrower the band the better. There are cases in which I make a porcelain crown without a band, but I advocate the band; it makes a better adaptation.

Attention has been well called to the singular facility with which the gum tissues take to the burnished metal platinum in place of gold.

Bear this fact in mind, as stated in the paper: A porcelain crown is as readily, as easily, and as quickly made as any other crown. It is artistic and permanent, and it is the up-to-date crown.

Dr. Brown. I understand the statement has been made that porcelain work cannot be ground, cannot be added to, and cannot be taken from. This is an error. You can cut and polish the surfaces of porcelain work and add to it to an unlimited extent.

Dr. Goslee (closing the discussion). Permit me to assure you of my gratitude for the manner in which you have received and discussed my paper. I should like to feel that I would be justified in taking this opportunity to close the discussion in a fitting manner, particularly after listening to the closing remarks of some of my *confrères,* but such is quite out of the question.

I want to agree with what Dr. Parmly Brown has just said in reference to the grinding or the adding to or subtracting from the previously glazed surfaces of porcelain. If the body is properly packed and manipulated it can be ground and polished and the result will be a smooth and well-vitrified surface.

With reference to the advantage of placing platinum next to the soft contiguous tissues of the mouth, I believe that these tissues take more kindly to platinum, or the alloy of iridio-platinum, than to any other metal, even pure gold.

Dr. Jenkins has referred to the employment of a band, but I believe he slightly misunderstood my paper. I said that I employed a band in a large proportion of my cases, and I do even on the anterior teeth wherever there is to be any lateral strain. Where the strain is to be more direct, however, all that is necessary is a close and accurate adaptation between the base and periphery of the crown and the root. Especially on the upper anterior teeth, however, I regard a very narrow, well-finished band as a decided advantage. But its success depends upon its accurate adaptation to the root on which it rests.

Dr. Simpson has said something regarding the use of porcelain by the country practitioner, or by those who may not have every facility for doing this work. In this connection permit me to say that from an economical viewpoint you can construct a porcelain crown at an expense not very much greater than the cost of ready-made crowns, and it does not take much longer to make a suitable cap, properly adapted to the root, than it would take to prepare your root, select a ready-made crown and then properly adjust it.

Dr. Brown referred to the statement that porcelain could not be ground or altered like gold after finishing. I do not think it should be necessary to grind gold any more than it would be to grind porcelain. I think that we can and should do our work in either instance so that it will not need grinding.

The Chairman. The next paper on the program is a contribution by Mons. B. Platschick of Paris, France, entitled "Tube Teeth, and Their Modern Applications." This paper will be illustrated by stereopticon views. I take pleasure in introducing my *confrère,* Mons. B. Platschick of Paris.

Dr Ottolengui was invited to occupy the chair.

[M. Platschick's paper was printed in full at page 789 of the July issue of the Cosmos.]

Discussion.

Dr. N. S. Jenkins, Dresden, Germany. Our thanks are due to the essayist for calling attention to an invention which has had and may still continue to have great usefulness. Tube teeth were de-

signed to be attached to metal plates through pins soldered to the plate. These pins were to pass through the tubes and the teeth were to be attached to the plates by melting sulfur to fill up the interstices. Very beautiful and very cleanly work could be done by this method, but it possessed certain disadvantages. These disadvantages were, First, instability. It was not possible to solder a pin suitable to the caliber of a tube tooth which, through the slight attachment of sulfur, should always permanently endure the force of mastication. In many cases either the tooth broke away from the pin, or, which was a worse disaster, the pin broke from the plate. In the latter case repair was a serious undertaking.

Second, the adjustment of the teeth was hampered by the unavoidable perpendicularity of the pin. Bound by this unchangeable condition it was not always possible to place the tooth in the desired position.

Third, the spaces between the necks of the teeth could not be filled up to advantage, for the teeth would not endure the heat then necessary to add and fuse porcelain for increased strength, beauty, and cleanliness. Tube teeth, although very dense, often of very natural color, and always of great strength, cannot endure a temperature much beyond the fusing-point of gold, and therefore have been unfit for such continuous-gum work as has hitherto been advocated.

It is, therefore, not surprising that with the advent of vulcanite these teeth should so generally have passed out of use. "The day of their destiny was over, and the star of their fate had declined." In spite of their beauty of form and color and that density which allowed of grinding and polishing without serious detriment to the surface, they were easily displaced by teeth of coarser texture which could be advantageously set upon a vulcanite base.

It is difficult to speak justly of the introduction of vulcanized rubber into dental practice. It greatly simplified and cheapened prosthesis, but at the expense of destroying, for a time, worthier and more artistic work. It supplied the masses with practical substitutes for the natural organs, but it led in many instances to the reckless extraction of teeth which could have been preserved in health and comfort for a lifetime, and to the general degradation of the standard of prosthesis.

But at the present day there is an almost universal revolt against this unhygienic and inartistic prosthesis; a revolt to which the concluding paragraphs of this interesting paper gives welcome evidence. The essayist gives us a graphic description of his method of employing tube teeth to make what is practically a piece of continuous-gum work, and this ingenious process excites only admiration.

But here I would venture to mention what I have at last achieved in this same direction. For years I have been working to produce a porcelain which should do for prosthesis what porcelain enamel has done for inlays, viz, to bring continuous-gum and porcelain crown and bridge work within the scope of the practice of every skilful dentist. This has been accomplished by the recent completion of a body which I have called "prosthetic porcelain," as it has been designed only for prosthetic purposes. Through its use tube teeth can be attached to iridio-platinum plates after the manner of M. Platschick, with the greatest ease and certainty; and also the teeth of all other manufacturers can if desired be united and combined in the same denture. This universally applicable porcelain fuses sufficiently below the melting-point of gold to permit the use of pure gold solder, a matter of great importance. I earnestly hope that this or some similar body may so far fulfil the wishes of M. Platschick as to still further advance the use of tube teeth which he justly commends so highly.

Dr. E. Parmly Brown, New York. The gentleman from the other side has presented a most excellent paper; as I understand, it relates to continuous-gum work.

I wish to describe a method of making porcelain plates which in my opinion is extremely valuable. I take a No. 34 gage

or thinner iridio-platinum plate, whether making full upper bridge, partial bridge, or continuous-gum work; I make two dies, a zinc die and a lead die. I swage up that, anneal it, make a duplicate, and then cover the upper side of the first one with pure gold, and the inner side of the duplicate—using blowpipe. I place between these two four or five thicknesses of No. 4 pure gold foil, use wet flux between those two, solder and swage, repeating that three or four times, and then have a third plate, soldering as before, getting a stiffer plate than ever has been made. The third plate is punched full of holes, about 500, like a sieve, to receive the porcelain, and when that is under white heat you have something like cast steel—you can't budge it—the gold and platinum have mingled.

M. PLATSCHICK. I must thank Dr. Jenkins and the other speakers for their kind remarks, but it astonished me to hear Dr. Jenkins' suggestions against the use of the tube teeth. He consequently does not agree with all the authors and writers mentioned in my paper, who have successfully employed the variety of teeth under discussion.

Dr. Turner resumed the chair.

The CHAIRMAN. The next paper on our program is one by Dr. FRANCISQUE MARTIN, Lyons, France, entitled "Immediate Prosthesis in Cases of Resections of the Jaws, According to the Method of Dr. Claude Martin." The paper will be read by Dr. Masson.

[This paper, with the discussion ensuing, will be printed in the forthcoming "Transactions of the Fourth International Dental Congress."]

There being no other business before the session, Dr. Turner, the chairman, declared Section VIII adjourned *sine die*.

SECTION IX: Education, Nomenclature, Literature, and History.

Chairman—TRUMAN W. BROPHY, Chicago, Ill.
Secretary—WINTHROP GIRLING, Chicago, Ill.

FIRST DAY—MONDAY, AUGUST 29.

The section was called to order at 3 P.M., by the chairman, Dr. Truman W. Brophy of Chicago, Ill.

On motion, the paper by Dr. GEORGE VIAU of Paris, France, entitled "*A propos* of a Portrait of Pierre Fauchard," was ordered to be read at a general session of the congress.

[For this paper, with the discussion thereon, see report of second general session, COSMOS, 1904, vol. xlvi, p. 1021.]

On motion, the session adjourned to meet on the following afternoon.

SECOND DAY—TUESDAY, AUGUST 30.

The section was called to order at 3 P.M., by the chairman, Dr. TRUMAN W. BROPHY, who then read his address, as follows:

CHAIRMAN'S ADDRESS.

Setting aside the fact that I may be charged with a misconception of the duties of chairman of a section in an international congress when I treat of the subject that I am about to discuss—a subject of interest to Americans chiefly—yet, in view of the fact that I have already presented addresses on dental education from the international point of view in foreign lands during the past five years, may I not here and now talk on a topic which occupies our thought in America? Therefore, inasmuch as the subject (in which I have concerned myself not a little) is of vital importance to our profession, our colleges, and our student body, I venture to present this topic that is engrossing us now.

The problem before us is the elevation of the standard of preparation of a dental student.

Briefly stated, I am going to consider

informally (1) The prerequisites of the student's education; (2) the *time* element in his professional work; (3) how to assist the student to accomplish his aims.

No matter what subject you may name, whether you refer to character, architecture, road construction, national or international laws, educational standards, educational institutions, all must be built, if we would have them endure, on deep, broad, and well-laid foundations.

Our section stands out conspicuously as the most important section of this great congress. Education and educational methods are now and ever will be the themes which claim the thoughts of our distinguished men, and elicit their best efforts from pen and rostrum.

A thorough education is the foundation upon which a professional man must rely if he would attain a high degree of success as a practitioner.

Men who have not thought deeply on the subject of dental education, particularly on the preparation most essential to equip students for matriculation in dental colleges, insist on certain standards of high-school and college work, in the belief, no doubt, that such standards are ideal ones; but while such preparatory training is quite sufficient for entrance upon the study of law, theology, or medicine, such instruction, followed by the conferring of the degree of A.B. and all that the degree implies, cannot, as taught in most of the schools and colleges, properly prepare a student for entrance upon the study of dentistry; nor can such preparation in the highest degree prepare a student for the study and practice of surgery in any of its branches.

We are all of us agreed that a thorough education is essential as a foundation for entrance into a professional school, but when we ask ourselves the question, To what use are we to put this education? then we are brought to realize what kind of a preparatory equipment a student needs to enable him to make the best and most satisfactory progress as a dental student.

In the advanced high-school and college courses, too little attention is paid to the subjects of physics and manual training. No matter how far a student may be advanced in his college course, his classical education and linguistic proficiency will not alone qualify him for the practical duties of the dental student.

Before entering the dental college a student should have taken, some time before or in connection with his higher educational work, a thorough course in manual training, and have acquired a knowledge of digital manipulations, and have become skilled in the use of instruments. Such a course of manual training is of inestimable value alike to the dental student and the medical student who expects to practice surgery.

Digital training, to make it of the greatest value, must be a youthful training, for manipulative skill is seldom acquired after the age of twenty-five.

The late Dr. W. C. Barrett, in discussing the value of digital training, related his experience in matriculating a freshman student, thirty-one years of age, who was a college graduate, and whose education in English, French, and German was very thorough. He told how the members of the faculty were pleased with the scholarly accomplishments of the candidate, and to one another remarked that, "If all our students were as well educated as this one, what superior practitioners they would make!"

In Dr. Barrett's words: "That man had the best-trained mind and most ignorant hand of any student we ever had in our college." With all his knowledge of the classics and his delightful personality he was ignorant of technology and lacked the manipulative skill so essential and indispensable to the dentist. Moreover, he was not able to acquire digital skill.

I am firmly of the belief that the preparatory education for matriculates in our dental colleges will soon be exactly what our faculties require. If we should publish in our annual announcements that three years hence all matriculates must have completed 48 counts, or the four years' high-school course, including a technical course in manual training, students would prepare themselves and come to us thus qualified. In justice to

prospective students it would only be fair to notify them long enough in advance, so that they might be able to comply with the higher requirements.

Holding a professorship in the Rush Medical College during the past twenty-four years, I have seen the admission requirements advance in that institution from a very low standard to the present high one. The requirement at the present time is fulfilled by the completion of the second year's course in the university.

While Rush Medical College exacts that its matriculates take a longer preparatory course than our National Association of Dental Faculties requires—necessarily barring many young men from admission—nevertheless its classes are large, and have greatly improved in scholarly attainment.

The faculties in our professional schools seem to overlook what I feel to be a duty to students who seek advanced standing. No matter how much knowledge a young man may possess, how thoroughly he may know branches of the curriculum, he cannot be examined, be given credits for his knowledge, receive advanced standing, and so shorten his college course.

It seems to me that the International Commission on Education, in co-operation with this section, in justice to young men who possess certain qualifications for advanced standing, should devise a plan by which the knowledge they possess can be determined, and by which the students may be graded according to their merits. I am confident that each nation participating in this congress could create for their respective countries a representative board, made up of men whose scholarly attainments, professional ability, and unswerving integrity eminently qualify them to examine applicants for advanced standing. Such boards of examiners would, I am satisfied, have the confidence and respect of the public and the profession everywhere; a board which would give each one examined such a certificate of credits as would enable any dental college to which the student might apply to give him the standing and classification among the students, and in the schools, to which his knowledge would entitle him.

STATUS OF AMERICAN DENTAL COLLEGES.

Recently the discussion of American dental colleges and the legislation of the National Association of Dental Faculties has brought out the fact that many gentlemen who write on the subject of dental education and who are administering the dental laws are not fully acquainted with the status of our dental colleges.

It seems, then, as if it were only just to our American colleges to place before the representative men of the dental profession of the world, as well as other professions and the public, facts regarding our dental institutions of learning. Moreover, the Committee on Foreign Relations of the National Association of Dental Faculties, through the strenuous efforts of its late chairman, Dr. W. C. Barrett, whose labors we all appreciate, has made us acquainted with the standing and courses of study of all foreign dental colleges, and is it not fair that the schools abroad should be informed in regard to the standing of our colleges, that our foreign co-laborers may have the same knowledge of our dental institutions of learning which we have acquired of theirs?

Let me first call your attention to statements frequently heard at home and abroad, to the effect that university schools are on a higher plane, and are entitled to higher consideration than other schools, whether connected with local universities or built up on their own individual merits.

It has been said that state university schools are endowed, or that they receive liberal appropriations from the state, and consequently are not dependent on the students' fees to defray the expenses of conducting educational work.

There is not a dental college in the United States, in the universities or out, that has an endowment of a single dollar. There is not a state university dental school which receives a state appropriation, if they receive any at all, equal to the fees which the treasurer of a university collects from the dental students. All

the dental colleges in the United States, therefore, are dependent upon the fees of the students to defray their expenses. The assumption of men who are not correctly informed, and whose voluminous writings on commercialism in dental schools state that colleges are conducted for commercial purposes, is unworthy of them, unjust, and misleading. Little do the men who make these statements realize the struggle of the founders of the Baltimore College of Dental Surgery, the first dental college in the world, and of the Ohio College of Dental Surgery, the second dental college; how hard Harris and Hayden, and Taylor and Taft worked as builders of dental educational institutions.

The Baltimore College of Dental Surgery was our first institution of dental learning, and every American dentist, every foreign dentist, should stand uncovered and bow his head in reverence when the name of its founder is pronounced, the name of Chapin A. Harris. Our hearts beat with pride as we recall the work of those distinguished men to whom the world owes a great debt of gratitude for the labor and sacrifices made in establishing dental colleges, and developing systematic courses of instruction.

While Harris was the founder of the first dental college, one of his immediate successors, Dr. R. B. Winder, was the founder of the National Association of Dental Faculties, an organization whose influence has been and will continue to be active in dental educational work, and it ranks among the foremost educational organizations of our country.

The achievements of Harris, Hayden, Taylor, and Taft were not easy; there were no endowments, no government appropriations for them; the colleges stood then as the American dental colleges do today—dependent upon the students' fees to carry on their work, and when the fees were inadequate these founders paid the bills out of their own pockets, as college faculties of dentistry do now, and in many instances received no compensation for their services, except the satisfaction of doing their duty in conscientiously teaching their students. Commercialism? Is it not necessary for an educational institution to pay its debts? Is there a man in this or any other country who has any practical experience in dental college management, who has not ofttimes been nearly at his wits' end to know how to get funds to enable him to add to the equipment of the college, in apparatus, furniture, etc.? It is owing to the statements previously mentioned, that our dental colleges are conducted for the purpose of making money, that I have referred to the subject, and in justice to my co-laborers, the dental teachers of our country, I declare that the strictest economy is necessary to meet the expenses of the colleges; and the compensation of the teachers, if they receive any at all, is in most cases insufficient for the time, ability, and energy expended.

The action in Washington in changing the course from seven months to six months was approved by some prominent men, who, apparently without analyzing the advantages or disadvantages of the situation, adversely criticized the action at St. Louis, by which action it was decided that a student might complete his studies within a period of three years, of which thirty teaching weeks in each year—of six days a week, exclusive of holidays—would constitute a full curriculum, and admit the student to the final examinations for the degree of Doctor of Dental Surgery.

The figures before you show that the St. Louis decision provided a course only forty-four days shorter than the four years' course of seven months, and fifty-two days longer than the four years' course of six months, adopted in Washington.

It is too apparent to require argument that the action of the association at the St. Louis meeting placed the educational work of our colleges on a much higher plane, and marked a decided improvement over the four years' course of six months. The four years' course of seven months would make it necessary for a student to spend either nearly half of his time outside of college, or, intervening the courses, remain in the infirmary

(provided his college had a summer practice course), and receive only practice instruction, with no didactic work whatever. Furthermore, he would be required at the close of his third year of the four years' seven months' course to wait twelve months longer, and get only forty-four days' instruction more than he would in the course arranged at St. Louis.

The National Association of Dental Faculties has a membership of fifty-four colleges. Of these, four are organic parts of the state universities — Michigan, Iowa, Minnesota, and California. These colleges are owned by the states and controlled by boards of trustees elected by the people of the respective states. I do not hesitate to say that the good work to the credit of the dental faculties of these schools has been handicapped by frequent and unjustifiable interference on the part of politicians, who have in many instances caused friction in the dental faculties, and through political influence have forced superior teachers and excellent men, who have ornamented our profession by reason of their greatness, to resign their professorships.

There are other dental schools which have a form of affiliation or a business contract which will enable them—if the conditions of the contract are carried out —to eventually become departments of universities. The universities, however, which have such contracts with professional schools, do not supervise the educational work, nor do they assume any responsibility—financial or otherwise—in conducting the school.

There are other dental colleges which are organic parts of local universities. Among these latter universities are Harvard, University of Pennsylvania, Northwestern University, Washington University of St. Louis, etc., none of which are in any way under state or government supervision.

The impression which has prevailed abroad to some extent, that certain of our university dental schools are under government supervision and that the educational work is conducted by teachers working under direction of the government bureau of education, and that the diplomas of such universities bear government indorsement, is incorrect. There are no dental schools under the direction of the United States government, consequently no diplomas bear its seal. If the state universities would appropriate sufficient funds to meet ever-increasing expenses to properly carry on the college work, or if endowment were provided to aid such schools, there would be some advantages derived from university connection. But as it is, the name "Department of the University" is of little or no practical value in assisting educational work.

By reason of the efforts of the National Association of Dental Faculties, which was organized in 1884, the educational standards of our dental colleges have been from year to year advanced (prior to which an applicant for admission to certain colleges, whose private instruction and practice extended over a period of five years, might matriculate in the senior class, and become a candidate for the degree of D.D.S. at the close of one course of instruction of five months). This standard was raised by the association, first, to two courses of six months each, with one year's high-school work as an educational requirement for admission; next, to three courses of six months each, with two years' high-school work as a prerequisite; and, finally, at Milwaukee, in 1901, the association adopted a resolution to the effect that the course of instruction beginning with the session of 1903-04 would be four years of seven months.

The dissatisfaction which arose among some of the colleges, in regard to the length of the sessions, led the association, at its annual meeting in Washington, to change the length of the term from four years of seven months to four years of six months. This decision was a compromise measure, but soon after the meeting adjourned many of the colleges tendered their resignations and announced to the secretary that they had decided to make the length of sessions eight or nine months, and complete the course in three years.

I received letters from the deans of

four of our oldest and strongest dental colleges informing me that they had resigned. At once I wrote them, urging them to reconsider their action, and at the same time I called a meeting of the deans of the Chicago colleges, and finally persuaded them to join me and get the officers of the National Association of Dental Faculties to assemble a meeting and adopt a course which would save the association from dissolution. This was done, and the association convened in St. Louis, where the following resolutions were adopted:

RESOLVED, That the minimum time for dental teaching required by this association to qualify students for examination for graduation shall be thirty weeks of six days each, in each of three separate academic years, exclusive of holidays; this resolution to take effect at once; and be it further

RESOLVED, That all rules or parts of rules in conflict with this resolution be and are hereby repealed.

All the catalogs of the colleges have been issued in accordance with the resolutions quoted, and it is now of interest to know exactly what the change in the course has been, as to actual teaching days, and in other respects.

I have made a careful tabulation of the actual time in days of college work, so that you may note the changes, in days, in the length of courses of the past and present. Let us compare the seven months' course of four years with the six months' course of four years, and with the course last arranged, of three years of thirty teaching weeks in each year, exclusive of holidays. [See table opposite.]

The courses in American colleges begin about October 1st and the seven months' course would end May 1st. We have, in these seven months, 212 days. There are 20 holidays, 31 Sundays, and the 30 Saturday afternoons, which would make 15 days more. A total of 66 days must be subtracted from 212 days, leaving 146 days of actual college work done in each scholastic year. This, multiplied by 4, the number of years, gives us 584 teaching days in the four years' course of seven months.

In the four years' course of six months, we get 181 days. From this number we must subtract holidays and Sundays, 59, which subtraction leaves us 122 days. This result, multiplied by 4, gives us 488 teaching days in the four years' course of six months.

The course adopted in St. Louis in July last is of three years, each year to consist of thirty weeks of six days in each week, exclusive of holidays. In thirty weeks of six days each we have 180 days. This number, multiplied by 3, gives 540 teaching days. The advantage in time which the seven months' course of four years has over the six months' course of four years is 96 teaching days.

The advantage of the four years' course of seven months over the three years' course of 30 teaching weeks of six days in each week is only 44 teaching days.

The advantage of the three years' course of thirty teaching weeks of six days per week over the four years' course of six months each is 52 teaching days.

If we take out the Easter holidays and every Saturday, in accord with the custom of some of the colleges, we must subtract twenty more holidays from each course of seven months. We have then in the four years' course of seven months each 504 teaching days, and as the present course is 540 teaching days we have, consequently, 34 days more college work in the present course than in the four years' course of seven months each adopted in Milwaukee.

And if the four years' course of six months had prevailed, the student would have been 48 months getting 24 months' instruction, and would have had 52 days' instruction less than he would get in such a course as has been arranged at St. Louis.

I believe the student and his parents are entitled to some consideration. To exact twelve months' time, one year's college course fees, and living expenses, equal at least to six hundred dollars, and to give only 44 days' instruction within the twelve months, seems unjust, but to require the same expenditure of time and money, to compel him to wait six months without instruction, and then to attend college six months longer, and thus to

TABLE SHOWING THE ACTUAL VALUE, IN DAYS, OF COLLEGE COURSES OF FOUR YEARS OF SEVEN MONTHS, FOUR YEARS OF SIX MONTHS, AND THREE YEARS OF THIRTY TEACHING WEEKS IN EACH YEAR OF SIX DAYS A WEEK, EXCLUSIVE OF HOLIDAYS.

The 66 holidays and Sundays are made up of the following:

	Days.		Days.
Alumni	1	Lincoln's Birthday	1
Election	1	Washington's Birthday	1
Thanksgiving holidays	3	Saturday half-holidays	15
Christmas holidays	13	Sundays	31

Total 66 days. (31 full days; 6 days Easter vacation.)

	Days.
Course of four years of seven months each year (per year)	212
Less holidays and Sundays (per year)	66
Total teaching days in one college year of seven months	146
Course of four years of seven months each year	4
Number of actual teaching days	584

	Days.
Course of four years of six months each year (per year)	181
Holidays and Sundays	59
Total teaching days in one college year of six months	122
Course of four years of six months each year	4
Number of actual teaching days	488

	Days.
Present course of instruction, three years of thirty teaching weeks, exclusive of holidays	180
Course of three years of thirty teaching weeks	3
Number of actual teaching days	540

Summary.

	Teaching Days.
Four years' course of seven months	584
Four years' course of six months	488
Three years' course of thirty teaching weeks (each year)	540

	Teaching Days.
Four years' course of seven months	584
Four years' course of six months	488
Excess of four years seven months' course	96

	Teaching Days.
Four years' course of seven months	584
Three years' course of thirty teaching weeks (each year)	540
Excess of four years seven months' course	44

	Teaching Days.
Three years thirty teaching weeks' course	540
Course of four years, six months each year	488
Excess of three years thirty teaching weeks' course	52

spend a whole year, giving him 52 days' less instruction than the present course provides, would be unworthy of the National Association of Dental Faculties.

It is of little consequence to the profession and the people *where* a dentist gets his knowledge, or whether he spends fractions of three years, fractions of four years, or fractions of ten years in a dental college, before entering in practice. This is not the question. The question that demands an answer is: How can our colleges best produce educated men, proficient dentists, and safe, reliable practitioners?

The action of the Faculties Association at St. Louis was *not* a step backward. It was a provision for a better course and a more exact course than had ever before been inaugurated. It fixes the days and hours that the student must attend college. Had I been able to control the action, the course would have been made 32 teaching weeks, exclusive of holidays, with an advance in educational requirements for admission, but the action of the association is most commendable in adopting a course which is a great improvement over the four years' course of six months. Such a course is equal to three years of nine months, including holidays.

Every teacher realizes that the vacations which occur in the short courses of six and seven months keep the college work in a state of constant confusion. The present course will in a great measure remove this embarrassment.

The experience of the dental school of the University of Michigan, which established a four years' course of nine months, five years ago, demonstrates in a practical way that no dental college can make a standard far in advance of other institutions and maintain an existence.

In 1900, the number of students enrolled in the Michigan University dental department was 247; graduates, 76.

In 1904: students, 94; graduates, 6.

The board of regents of the University of Michigan found it necessary to either conform to the rules of the National Association of Dental Faculties or discontinue the dental department.

As I have said in the beginning, our questions under discussion may perhaps claim an international interest.

Let no man assume that dental education in America is likely to become a retrograde movement. To do so would be un-American and contrary to the traditions of our institutions. We are proud of the history of the dental colleges of our country, and while the National Association of Dental Faculties has in some matters taken steps which I wish had never been taken, and which I heartily wish it could retrace, on the subject of the course of instruction and how to instruct this great body stands for the highest and the best. The dental profession everywhere, and our sister institutions in foreign lands, may rely upon the work started by Harris and Hayden to be carried on by the distinguished men who are assembled here today, and who, when the next International Dental Congress convenes, will have advanced our educational institutions to a higher position; and the American dental graduates of the future, as in the past, will take high rank with the members of our profession throughout the world.

[For the discussion of Dr. Brophy's paper, jointly with the following paper by Dr. Hunt, see page 977.]

The next order of business was the reading of a paper by Dr. A. O. Hunt of Omaha, Neb., as follows:

The Count System of Students' Credits.

At the request of the chairman of the Section on Education, Nomenclature, Literature, and History, I have consented to present a paper on this subject, with some misgivings as to whether the proper time has yet arrived. The system is entirely new in its application to the dental curriculum and is unfamiliar to teachers and managers of dental schools. It is adapted to all other conditions, however, and there is little doubt of its final success; but its practicability is yet to be tested in this relation.

The public-school system is the foundation of true Americanism and the bulwark of our strength. It is the standard of excellence and the standard by which

all things are finally tested. It produces the best morals, the best politics, the largest amount of intelligence (per capita) and that superabundance of energy observed in every avenue where human effort is displayed.

The system begins with the primary school and extends through the secondary or high school to the state universities. It is under the control of the government, national, state, and local.

While the purpose of having good schools in each grade is general, yet methods would necessarily vary, as well as the subjects taught. There are high schools of one year, of two years, of three years, and of four years, in which the teaching is not the same even in those with the same length of time.

It has been necessary in some cases to have preparatory departments as part of the universities in order to equip the student for entrance into the university proper. As a considerable number of the high schools of a state advanced to four-year courses, or to an equivalent to what has been taught in the preparatory departments of the universities, these latter departments were dropped by the university, and students of such high schools were admitted to the universities without examination and became what is called accredited schools. There are also other schools in existence that are private, or special in their character, over which the state or government exercises no control. They also have their own methods of teaching and arrange their own curricula.

This lack of uniformity produces the condition that the credentials or diplomas for the same degree issued by the various schools do not always represent the quality or quantity of work the student may have had.

In 1784, by the act of the New York legislature, there was established the University of New York, composed of nineteen regents. Each appointment was made for life. It was reorganized in 1787. The Governor, Lieutenant-Governor, Secretary of State, and Superintendent of Public Instruction are members *ex officio*.

As the count or credit system originated with this body, and has been used by it for nearly half a century, it may not be out of place to quote from the *Bulletin* what their function is:

UNIVERSITY OF THE STATE OF NEW YORK.

Object.—The object of the University as defined by law is to encourage and promote education in advance of the common elementary branches. Its field includes not only the work of secondary schools, colleges, universities, professional and technical schools, but also educational work connected with libraries, museums, study clubs, extension courses, and similar agencies.

The University is a supervisory and administrative, not a teaching institution. It is a state department and at the same time a federation of more than one thousand institutions of higher and secondary education.

Government.—The University is governed and all its corporate powers exercised by nineteen elective regents and by the Governor, Lieutenant-Governor, Secretary of State, and Superintendent of Public Instruction, who are *ex-officio* regents. Regents are elected in the same manner as United States senators; they are unsalaried and are the only public officers in New York chosen for life.

The elective officers are a Chancellor and a Vice-Chancellor, who serve without salary, and a Secretary. The Secretary is the executive and financial officer, is under official bonds for $10,000, is responsible for the safekeeping and proper use of the University seal and of the books, records, and other property in charge of the regents, and for the proper administration and discipline of its various officers and departments.

Powers and Duties.—Besides many other important powers and duties, the regents have power to incorporate, and to alter or revoke the charters of universities, colleges, academies, libraries, museums, or other educational institutions; to distribute to them funds granted by the state for their use; to inspect their workings and require annual reports under oath of their presiding officers; to establish examinations as to the attainments in learning and confer on successful candidates suitable certificates, diplomas, and degrees, and to confer honorary degrees. They apportion annually an academic fund of $350,000, part for buying books and apparatus for academies and high schools raising an equal amount for the same purpose, $100 to each non-sectarian secondary school in good standing, and the remainder on the basis of attendance. The regents were also granted in 1901 $20,000 for the benefit of free public libraries.

Regents' Meetings.—The annual meeting is held the first Thursday in December, and

other meetings are held as often as business requires. An executive committee of nine regents is elected at the annual meeting to act for the board in the intervals between its meetings, except that it cannot grant, alter, suspend, or revoke charters or confer honorary degrees.

Convocation.—The University convocation of the regents and the officers of the institutions in the University, for consideration of subjects of mutual interest, has been held annually since 1863 at the capitol in Albany. It meets Monday, Tuesday, and Wednesday after the fourth Friday in June.

At this convocation, though it is primarily a New York meeting, nearly all questions discussed are of equal interest outside of the state. Its reputation as the most important higher educational meeting of the country has in the past few years drawn to it many eminent educators not residents of New York, who are most cordially welcomed and share fully in all discussions. A council of five is appointed to represent it in intervals between meetings. Its proceedings, issued annually, are of great value in all educational libraries.

For a better consideration it may not be amiss to refer to a subject now under discussion before the regents, relating to the combined baccalaureate and medical courses, which shows the care and consideration exercised in reaching conclusions involving important changes. Again quoting from the *Bulletin:*

SHOULD THE REGENTS REGISTER COLLEGE COURSES AS THE EQUIVALENT OF THE FIRST YEAR IN A MEDICAL SCHOOL?

In 1902 an amendment to the medical laws of the state of New York provided that the regents might accept as the equivalent of the first year of the full four years of at least nine months each, including four satisfactory courses of at least six months each in four different calendar years of a medical school, evidence of graduation from a registered college, provided that such college course should include not less than the minimum requirements prescribed by the regents for such admission to advanced standing.

At convocation in 1902 a thorough discussion of the requirements for admission to medical schools, including the combined baccalaureate and medical course, was participated in by representatives of both the medical and liberal arts faculties of representative New York institutions.

In continuation of the study a suggested outline was prepared and sent to many leading educators, both of New York and other states of the Union, to learn their opinion regarding the outline of subjects and their treatment during the first medical year as follows:

Suggestions: Anatomy 150 hours, laboratory 50 hours at least. Biologic sciences 150 hours, laboratory 50 hours at least.

The course is then definitely outlined as to the teaching of histology and microscopy, botany, zoölogy, and bacteriology.

Chemistry 150 hours, laboratory at least 50 hours. Physics 100 hours, laboratory 40 hours. Physiology 100 hours, laboratory 50 hours.

Correspondence was had with the representatives of the following interested institutions:

Independent colleges: Hamilton, Colgate University, Princeton, Oberlin, and others.

Independent medical schools: Long Island College Hospital, Albany Medical College, and others.

Universities: Cornell Medical College, Syracuse University Medical Department, Harvard University, Yale University Medical Department, University of Pennsylvania, University of Michigan, American Academy of Medicine, etc.

To supplement the information gained by this correspondence there was also presented the action of the Association of Medical Colleges, as follows:

At the meeting of the Association of American Medical Colleges, held at Atlantic City, June 1904, Dr. Henry L. Taylor of the New York State Department of Education, presented a paper on the subject which elicited much discussion. At this meeting the following resolutions were adopted:

"Resolved, That the Association of American Colleges approves of the so-called combined system of college and medical education, and of giving time credits not exceeding one year, to the holder of A.B., B.S., or other equivalent from a reputable college or university, provided such a student has had at least 900 hours in physics, chemistry, osteology, histology, embryology, anatomy and physiology, and provided the applicant for such time credits satisfies the professors attached to the medical college as to his proficiency in the first year medical studies."

"Resolved, That a committee on national uniformity of curricula be appointed to cooperate with a similar committee appointed

by the National Federation of State Medical Examining and Licensing Boards for the purpose of presenting a minimum standard of medical education, together with such recommendations as the committee may deem proper to make as to the division of the subjects in a four years' graded course. Said report to be presented at the next annual meeting and to be printed and distributed at least one month before the annual meeting."

"RESOLVED, That no student shall be admitted to advanced standing without a direct communication from the dean certifying as to the applicant's credits and moral qualifications."

All these matters are introduced to show the importance of the careful consideration of the system of counts in establishing a safe, inflexible, systematic standard upon which to base the work of advancement so much desired.

There might be profitably selected quotations from speeches made before the annual convocation of the regents, where men representing all sides of any movement both within and without the state of New York take part.

The *Bulletin* issued by the regents is replete with the opinions of all of the best men interested in the advancement of education on every topic that may come before the body for consideration.

It will be well for us then in the interest of the advancement of dental education, to become familiar with the methods of a body of men who are entirely free from the entanglements of politics, sectarianism, and personal aggrandizement, who for more than a century have fulfilled their trust faithfully and well, and for more than half a century have tested the virtues of the count system and applied it to all the phases of education of whatever character, holding always to the one idea that when the regents' certificate has been issued to any individual it represents a definite amount and quality of instruction as scheduled by them in various publications.

Independent of the sources from which it may be obtained, their system is so hedged about with precautions that are just and equitable, that it cannot but be accepted as final by any body of men called upon to act upon their credentials, whether in America or elsewhere, if they are familiar with their methods, which are published to the world.

The count system in itself is a very simple affair. Its application to the varying conditions is not so simple but is not in any way incomprehensible or impossible.

It consists in the establishment of a "unit" that stands for something definite. Their unit for the academic courses stands for one day of a week of five days of not less than forty minutes each day for ten weeks' instruction in each branch of study included in any course as counting one.

The year's course is expected to include forty weeks of work, so that any branch of study pursued for one school year through four terms will have credited to it at the end of the year four counts, or forty-eight counts for the full four years' high-school course, three studies for each term or period.

In other states of the Union the principle of the system has been adopted but the basis of the unit may be different. In our section, in Nebraska, for instance, the year is divided into two semesters of twenty weeks as the basis of the unit instead of ten. Each student in a four years' course of high-school work understands clearly that he must carry four studies for the year, or when he comes up for graduation at the end of his four-year course he must have to his credit thirty-two counts, or eight for each year, before he will receive his diploma. There are additional branches that may secure thirty-six counts. Nothing can be more simple and capable of understanding by both pupil and teacher.

There are two well-organized bodies of men, the National Board of Dental Examiners and the National Association of Dental Faculties, in this country, composed of representative men who are all without exception interested in the advancement of dental education. While their motives are identical, many things intervene to make their actions not always harmonious.

Let us first consider the National Board of Dental Examiners—a body without any legal status itself, yet made

up of representatives of bodies that have the highest legal standing by state enactments. This comes from the conditions that exist in the organic laws of the country. The national government has certain rights that are not delegated to the states, and beyond which it cannot go. Each state is competent to make laws that may suit itself and are legal so long as they do not encroach upon the position occupied by the national government.

It is evident, then, that each state may pass laws for its own guidance that are entirely independent of laws that any other may pass. This has produced variation in the laws regulating the practice of dentistry in the various states. Some are in advance of other states on this account, and there is not opportunity in this paper to discuss them further, only to state the fact. However, the point that affects all alike is the difficulty presented in each case for the state examining boards to fix a standard that shall be uniform and have a definite basis.

Many of the laws contain this clause, which is a stumbling-block: "To accept the diplomas of all *reputable dental colleges.*" Now the boards have never been able to come to a decision as to what a *reputable* dental college is. Some of the laws attempt to define it by enumerating the various branches taught in all well-organized dental colleges. It happens that a college of low standard may teach the same subjects, so that under this definition all schools are reputable that teach those subjects.

The boards as yet have not been able to perfect an arrangement acceptable to all, whereby a person fully licensed in one state may remove to another and be allowed to practice there. In a few words, there is no standard as yet established that is acceptable in all parts of our country. Many of these conditions will be changed eventually by state enactments or by an arrangement between the various boards. The count system of credits is undoubtedly the only means when fully understood and inaugurated that will secure a standard that will form a basis for reputability by which this can be accomplished.

The National Association of Dental Faculties, another body that is vitally interested in the consummation of the universal standard, has been working along its lines and according to its lights, in the furtherance of this object.

In 1884, when the body was organized, there could not be conceived a more unsatisfactory condition existing than then existed as to the standard of dental education. No preliminary requirements. No uniformity in the course of instruction, and all things in a chaotic condition.

This organization has steadily advanced along its course, bettering things continually from the beginning. It is not necessary to go over the many episodes that have happened in twenty years. It has, however, raised the preliminary requirement in twenty years from nothing to the entrance into a third year of a four years' high school or to an equivalent of twenty-four counts by the New York regents' standard. In 1895 this association adopted a minimum entrance requirement, at that time but little above the finish of a grammar grade, with progressive advancement for each year. This was rescinded in 1896. Had the action of 1895 been continued we would have had an entrance requirement at this time (1904) of the completion of the high-school course, or forty-eight counts by the New York regents' standard. This would have come about without any hardship to either students or schools.

The National Association of Dental Faculties has adopted the count system again this year, with the preliminary requirements of entrance into the third year of a high school, or twenty-four counts. It has also adopted the count system to be applied to the regular curricula of the schools. The following is the schedule: Unit—I hour per week of lectures for a semester of 15 weeks, equal one count. Unit—2 hours of laboratory work to be equivalent to one hour's lecture. Special subjects, two of which constitute one count—Embryology, electricity, diseases of the antrum, juris-

prudence, facial art, hygiene, regional anatomy, dental ethics.

This is the keynote to the situation. If all of the bodies interested in the advancement of dental education in this country and elsewhere will apply the same earnestness and conservatism freed from personality, politics, prejudices, etc., and study this question, and discuss it freely (after obtaining the necessary information relating to the count system) with all interested, in the opinion of the writer nothing but the perfect advancement of the cause is possible, and it will secure a standard that can be accepted by all as just, equitable, and fair.

Perhaps it will not be possible to get the best results without a new organization or committees with supervisory and administrative powers selected from the National Association of Dental Examiners, the National Association of Dental Faculties, and from the International Dental Federation, to whom all matters will be willingly relegated and with whom all schools which desire a full recognition of its standard may register.

Certificates issued by such a board will constitute a standard based upon something definite, and will carry with it the positive assurance of value, correctness, and authority of an organization that will be recognized throughout the dental world as having supreme authority in such matters.

This can only be accomplished by the use of the count system, which will regulate the quality and quantity in every branch of instruction established; it will carry with it a dignity and respectability that does not now exist. Students upon entering the study of dentistry will have a higher estimate of the profession, and will themselves, both as students and graduates, be interested in forcing the standard up to the highest point consistent with good results.

Discussion.

Dr. H. L. Banzhaf, Milwaukee, Wis. I can only express my hearty approval of what Dr. Brophy has said concerning the entrance requirements to our dental colleges. I think that the high-school diploma is the most rational requirement, and believe that the high school comes nearest to solving the perplexing problem of preliminary education. It seems to me there can be no doubt that it can safely be considered the best instrument for preparation within the reach of the general public. The adoption therefore of the high-school diploma as a preliminary requirement to our colleges will unquestionably be found to be an efficient means of uniformity.

Another point which Dr. Brophy has brought out appeals to me very strongly: It is just as necessary to deal in definite quantities as to the teaching months, days, or hours required in our curriculum as it is to adopt the count system in the grading of credentials presented by the student.

Dr. Hunt's paper has been particularly instructive to me, and I want to express my hearty approval of the suggestions which the essayist has made in regard to establishing a board to be composed of representatives of the National Association of Dental Faculties, the National Association of Dental Examiners, and the International Dental Federation. If this were done I believe it would insure the selection of men eminently fitted for such a position, and this board, with supreme power, could settle many questions that are now troubling us. Such a board, then, might be considered an international board of arbitration and therefore our court of last resort.

I am sure that I appreciate and understand the practical workings of the count system, especially as applied to the grading of our students, better than I ever did before, and I think it is a great pity that every teacher who occupies an executive position in a dental college, and every member of the National Examiners' Association could not have been present to listen to both these very valuable essays.

Dr. L. P. Bethel, Columbus, O. I have enjoyed both of these excellent papers, being especially interested in the address of Dr. Brophy, as it presents ideas that I have for a long time advo-

cated. Making the college course a uniform one is a matter I have urged in the National Association of Dental Faculties for two years, and I was pleased to learn of the adoption of such a course at the recent meeting of the association. When the course of four years of seven months was established there was no mention made of the number of teaching days in the week. I see Dr. Brophy has estimated five and one-half days. A number of colleges have taught only five days in the week, and that has been countenanced by the association. Taking five days a week as the recognized requirement, that would be fifteen days less than Dr. Brophy's estimate, or one hundred and thirty-one days for the year. Now, for the four years of seven months, that would make five hundred and twenty-four teaching days instead of five hundred and eighty-four, as shown on the chart, and five hundred and twenty-four days in four years would be less than the length of course now adopted, three years of thirty teaching weeks, six days a week, for that amounts to five hundred and forty teaching days. So in the present course of three years of thirty weeks we are really teaching sixteen days more per year than in the four years' course of seven months each. As Dr. Brophy says, I do not see that the action has been retrogressive at all. I believe we are progressing. Establishing a uniform course in dentistry is but a just and equitable thing to do.

Dr. H. A. Smith, Cincinnati, O. Dr. Brophy, in his able address, has given us good reason why the recent action of the National Association of Dental Faculties in changing the minimum course of study in our dental colleges is not necessarily a retrograde step. When we consider, as he has shown, that there is a decided gain in active teaching time over the four years of six months' course, with a strong probability of soon extending the session to at least eight months of actual teaching, it is evident the National Association of Dental Faculties has taken an advanced step in dental education.

This change, together with the proposed adoption of the higher entrance requirement—that of a high-school graduation or its equivalent—should give us the basis of an ideal dental college course for a good number of years to come. It is obvious, I think, from the experiences of the past, that frequent changes in our educational methods are detrimental to that true advancement in dental education that we all hope for.

Dr. James McManus, Hartford, Conn. I was pleased with the inclination of the faculties, or a certain portion of them, to give to the students practical and theoretical education and do it in as limited a time as possible. A student knows the hours he will actually get, the teaching that he pays for, and hereafter the board of examiners cannot question, as in the past, whether the student has been given the instruction that he ought to have had. It seems to me that the faculties have their eyes open to the fact that there is something yet to be done by them, and they have made up their minds to do it.

Dr. William H. Trueman, Philadelphia, Pa. I feel a keen interest in the question of dental education, and I think Dr. Brophy's suggestion that the dental schools should be made stronger financially is timely and to the point. Very few schools devoted to the higher branches of education are entirely dependent upon their students' fees, as are nearly all the dental schools. This higher education is expensive. Its students require more room, they must be provided with expensive apparatus and appliances, and with talented teachers. All of these things cost money. There is no question that our dental schools would do better work if economy was less considered. The newer methods of education which the dental schools are adopting call for smaller classes and more teachers. The lecturer is giving way to the demonstrator, and training is taking the place of dialectics. The professors are not well paid, and many of the demonstrators serve for but little more than the practice and experience the position gives them, and serve only until their private practice requires all their time. With sufficient funds at command to properly

remunerate talent, the colleges could select from available candidates those who had not only ability but the gift of teaching, and build up and retain a staff of well-qualified and experienced teachers and demonstrators.

If the profession wants better schools it can have them by providing the necessary financial support. With all its advances in education, the dental profession in this country has made very little progress on that line. Some of its members have prospered, and dying have left millions, but of their accumulated fortunes very little indeed has been left for the betterment of the profession. In Philadelphia, I know of but two bequests to a dental college; they amounted to about one thousand dollars. An advance in dental education is not so much a question of days and hours as it is a question of dollars and cents. Our dental schools have proved their usefulness and their worthiness. They have done well, exceedingly well, but can do better, and will do better, if furnished with less advice and more cash.

Dr. J. H. Kennerly, St. Louis, Mo. The subjects presented by Drs. Brophy and Hunt are of vital interest to teachers in the dental schools of the United States. Dr. Trueman has made a remark which brought a thought to my mind, or, rather, it was a reminder of a circumstance of not long ago. I asked the chancellor of the university with which I am connected, for a certain amount of money. He asked: "What do you want it for?" I told him, to buy brains. He said, "I can get all the money you want for buildings but I can't get a cent with which to buy brains." The brains I wanted to buy in this case was the McKellops library. It seems impossible that in the city of St. Louis, which spent $25,000,000 on the World's Fair, it should not be found possible to raise $10,000 to buy such a work as this. Within the World's Fair grounds we have buildings that cost $2,000,000, all given by the generous friends of the university. Men of means in this city or any other city are willing to give money to build large buildings, monuments to their memories, but when you go to a man and ask him to endow a chair it is next to impossible to get him to do it. While Washington University has been teaching in St. Louis for nearly fifty-five years, she has but one endowed chair, and that one was endowed by a brewer. My sole business is to promote the interest of the department of the university which I represent. The medical department of Washington University has several endowments, and small bequests sometimes come to the other departments, but they are very small. There are men here who have millions and could they be persuaded to give us an endowment it would enable us to buy the brains we need.

The subject of the count system has worried me as much as anyone else. There has been a constant interchange of thought with Dr. Hunt in connection with this subject. I have always believed it a good thing, for I don't believe one of the oldest institutions in the country would adopt anything not good. Compare the teaching of today with what was done twenty or thirty or forty years ago and as much difference will be found as in any other branch—if not more. There is one little mistake that the dental profession is making, and that is the claim that we cannot eliminate the money question. It seems to me as though it had been eliminated to a considerable extent. Has it ever occurred to you that you have three or four men teaching the same subject that was formerly taught by a single teacher when you were a student? and yet the cost of tuition remains the same. But you say, We are teaching longer terms. That should make no difference. As an illustration I will give you a little personal experience. When I decided to become a student I secured catalogs from several schools and finally selected the one that seemed the best. It was a two years' course of six months. I had been there but a few days when the demonstrator came to me and told me to get my instruments and put a filling in a certain tooth. I had never filled a tooth, I had never prepared a cavity, but I

proceeded to prepare this one as best I could—cleaning out everything that did not seem to belong there. And then I put in the filling, but it wouldn't stay. Every time I put it in it would roll out and I could not understand why the amalgam wouldn't stay in the cavity; but I later found that it was mercury and not amalgam with which I was attempting to fill the tooth. Now, I guarantee that in the fifty-four schools composing the National Association of Dental Faculties, you will not find a man who, when he enters the operating room, cannot prepare a cavity and introduce a filling better than we could at the end of a two years' course of six months.

There is another question with which we must deal. It is this: The different state boards believe they can best control the dental colleges by examining their students. I believe the schools agree with them. I do, at least. There is a movement on foot to amend the state laws requiring every man who comes into the state to be examined. With four terms of six months these men would be forced to go elsewhere and earn their living during six months of each year. They will forget what they have learned during the first year's work and it will be three years before it is brought back to their memory, and then by the state board, and your men may fail and your work be lost. On the other hand, if we raise the standard and decide that the three years' course of nine months is the better, then we will educate our men so that no man who goes out with our diploma need be afraid of any state board. This is the only solution of the question that I see.

Dr. Brophy. I would like to make a comparison of my schedule here with reference to Dr. Bethel's statement. If we take out the Easter holidays and every Saturday, that will add twenty more holidays to the course of seven months, and would make a course of 504 teaching days. We have, consequently, 34 days more in the present course than in the course adopted at Washington.

In conclusion, I thank you for the enthusiasm you have shown.

Dr. Henry W. Morgan, Nashville, Tenn. These papers have been so thoroughly discussed that nothing is left for me to do but compliment the two essayists and say that I think they put these two matters before the profession of the United States in a form more concrete and graspable than any papers we have yet had, and I hope to see them soon in print.

Dr. A. O. Hunt (closing the discussion). Just a word or two to get into our mind what is meant by the facts as they have been presented. We talk of years and of months, and when we use the word year in connection with the term of instruction it is always misleading. Of course, we will still be compelled to use it, but in a general sense. Here is the point, 584 days represents a quantity of work done. We must know just how much teaching and what kind of teaching is done in these 584 days, each branch being definitely settled as to the certain number of credits each student must have; then we have the quality. The number of days represents the quantity of work, and the credit or count the quality. These two facts are essential in establishing a permanent basis that everybody will agree is accurate and right. By experience it has been demonstrated, and for more than half a century, that up to this time the count system meets all conditions and is exact.

The subject was passed and the chairman called for the next paper by Dr. Charles McManus Hartford, Conn., entitled "International Character of the Early Development of Dentistry in America."

[This paper was printed at page 318 of the Cosmos for March 1905.]

Discussion.

Dr. William H. Trueman, Philadelphia, Pa. I congratulate Dr. McManus on having brought to our notice a new phase of dental history, and an interesting one. Science is cosmopolitan; to this, dental science is no exception. Medical knowledge seems to have first crystallized into a science among the Arabians, and the

works of their able writers were standard for several centuries. Then Italy took the lead, then France. It was in France that the art and the science of dentistry made a notable and distinct advance by becoming a recognized specialty whose practitioners were known as dental surgeons. When the science reached America it found fallow ground. We were not trammeled by traditions of the past, but were energetic, progressive, and resourceful. New heads and new hands in a new country almost made it a new science. We gathered in the best the nations of the world had to offer, and quickly made it better. We have originated but little, but we have elaborated, improved, and made practical a great deal. Gold foil, especially prepared for dental use, was first made in the United States, where also the best methods and appliances for forming it into tooth-saving fillings originated. Prosthetic dentistry has been remodeled under the magic touch of American ingenuity. Dental education and dental literature owe a great deal to American brains. Although, as Dr. McManus has shown, we owe a great deal to the old world, we have, I think, paid the debt with ample interest. We must not forget, however, a caution Dr. McManus' paper suggests. The nations of the world are all wide-awake. Dental science is progressing rapidly on the other side as well as here. If we rest content with having gained a fancied pre-eminence, we may soon become a "once was."

Dr. A. O. Hunt, Omaha, Neb. The reference in the paper to the general belief that we spring from the barber, tinker, and blacksmith is something that I always have resented. We have had these men among us, but they are not the men who have made the history of dentistry. It was not the barber, or the tinker, or the blacksmith, but the educated gentleman who is responsible for the progress and who has held up the profession through the ages and given it dignity and position in spite of the incubus of the barber, tinker, and blacksmith.

The subject was passed, and Dr. S. H. Guilford, Philadelphia, Pa., read a paper on "Nomenclature," as follows:

Nomenclature.

It has frequently been asserted and by many it is believed that a language bears a close relation to the character of the people who originate and employ it. It would be strange if it were not so, inasmuch as anything which man devises is a direct expression of his needs or desires, and could not well be dissociated from his personality in some form.

The Latin races, with their nervous energy and rapidity of speech, employ more words in the expression of their ideas than many other nations. If several simple words are needed to fully express a condition, or state, or object, they are all pronounced and written separately, though fluently spoken.

The Teutons are more slow of speech, more deliberate, more phlegmatic possibly. With them, when an idea needs several single words to express it, they join them into one long, cumbersome word, which may be easy enough for them to comprehend and speak, but which certainly is not so to the foreigner.

The Anglo-Saxons occupy a position between the others. They do not often combine several pure Anglo-Saxon words to form a composite one, but usually employ the single words with such slight abbreviations as will not impair their value. When a composite word is needed in English, it is constructed from foreign derivatives, sometimes hyphenated but more often not.

Although German is regarded as a language rich in expression and comprehensive in words, neither it nor any other is sufficiently replete to meet the ever-increasing demands of science, art, or philosophy.

Nature is constantly revealing herself to man in so many new ways that his vocabulary fails him in defining or expressing them. He therefore is often driven to the necessity of coining new words or terms, which, while in certain cases they mean nothing in themselves, by association with the idea expressed and with nothing else, are accepted and incorporated into the written and spoken language, where they serve as definite a

purpose as others which have a philologic basis.

Thus when the development of electrical science required that certain phenomena should be named so that they could be dealt with in a mathematical, mechanical, and commercial way, it was found that there were no single words in any known language that could be made to serve. New terms therefore had to be coined, and it was happily decided to employ the names of certain persons who, in their day, had been engaged in electrical investigation and had enriched the science by valuable discoveries. In this way the names of Ampère, Volta, and Ohm came to represent the units of electrical volume, force, and resistance, and France, Italy, and Germany were incidentally honored in their selection.

This plan, while serviceable and commendable in certain cases, could not well be followed to any great extent, and in the coining of new words it has been found most convenient to name the new objects or processes after their most prominent characteristics. In many cases it served a better purpose to take the roots from some foreign language and combine them into a single word, thus doing away with the prepositions which would otherwise be necessary in English. The terms photography, biography, etc., were thus created and have proved entirely satisfactory, both on account of their simplicity and their definitive character.

When the new metal radium was discovered, it received its name from the peculiar rays which emanated from it, and when it was found that these rays were capable of affecting a sensitized plate or film and fixing upon it the form and outlines of a given object, the second word radiograph was quickly and scientifically adopted.

So too with the Roentgen ray. It had no previous known place in nature or in the vocabulary and therefore it was given the name of the discoverer. However, as the term Roentgen ray was somewhat cumbersome and as it in itself did not express any characteristic of the peculiar phenomenon, it was renamed X ray because this algebraic figure, used to denote an unknown thing or quantity, corresponded with the hidden or unknown source of the rays. When it was found that these rays affected a photographic plate much in the same way as sunlight, the impression thus obtained was known as an X-ray photograph. However, these three words seemed unwieldy, and as it was the opaque objects which were impressed upon the sensitive plate and not the transparent ones, as in photography, the term photograph was not scientifically correct. A new term, skiagraph, was therefore coined which exactly described the fact that it was a shadow picture.

Again, when Edison improved and developed the original moving-picture toy into an instrument capable of illustrating on a large scale the motion of men, animals, or other objects, a word was needed. Biograph was at first accepted, but as the word indicated life in the object depicted and as many inanimate objects were equally represented in a state of motion, a more specific term was demanded, and the word kinematograph was substituted, for it signified movement-pictures or illustrations. For the sake of euphony and convenience this term was later abridged to kinetograph.

It will be noticed that in the terms thus far given all are derived from Greek or Latin roots, indeed, all Greek but one. The reason for this is the fact that both are dead languages. Words in a living language often change their meaning through time and custom, but those of a dead language are incapable of it and are thus stable and fixed. We therefore find that the new words introduced into any of the sciences today are taken from one of these languages or are constructed from their roots.

For this reason it would seem best that in our own science, where single or combined English terms cannot be made to express the idea desired, the new words coined should be taken from the "dead" languages.

Most of the distinctive technical words now found in our text-books are thus derived, many expressing a fine shade of

difference, such as the terms anesthesia and analgesia.

Orthodontia expresses, as well as any compound word can, the nature of the condition with which it has to do, while the newly-coined term prosthodontia, while not quite accurate in its derivative meaning, is so convenient and so nearly correct as to sanction its permanent adoption.

The term "autogenous" soldering, as used to denote the union of like metals at a point just short of fusion without the interposition of an alloy to facilitate the process, while not quite correct etymologically, should be considered satisfactory until some more accurate one is devised.

The word odontotechny, while not new by any means, has for some reason never been generally adopted, although it is etymologically correct and comprehensive. By its use, the double word "dental-technics," which is less convenient and is moreover a hybrid, being part Latin and part Greek in origin, would be avoided.

We employ the related words odontology, odontalgia, etc., and so it would seem the part of consistency, at least, to incorporate the word odontotechny into our working vocabulary.

It is a pleasure to notice that many terms adopted hastily, and which answered their purpose for a time, have been discarded because they were not in any way indicative of the condition or part which they were intended to designate. Riggs' disease is a term almost unknown to the younger generation, although the medical profession still retains a few expressions of a similar character, such as Pott's disease, Addison's disease, etc.

Pericementum has supplanted both the inaccurate term periosteum and also the cumbersome one peridental membrane. Resorption has taken the place of absorption when applied to the dissolution or gradual removal of calcareous tissue.

The term "antrum of Highmore" has made way for the more expressive one "maxillary sinus." Both designate a cavity, but the former does not indicate its location, while the latter does. Pyorrhea alveolaris is a cumbersome term and not at all accurate, yet it designates one of the manifestations of a disease and also its location. For this reason and the further one that no other combination of words has appeared that could be readily handled, the former term has thus far refused to be displaced.

In the whole range of dental science, however, no department or specialty is suffering so greatly from a lack of accurate and expressive terminology as orthodontia. Many terms employed in this branch are absolutely incorrect, while others are of very doubtful utility.

Occlusion is a good term when properly used, but it signifies a coming together or contact. Malocclusion is also correct when it is employed to signify that the teeth of one jaw meet those of the opposite one in an incorrect or abnormal manner, but it cannot justly be used to indicate the malposition of teeth. Much less can it be applied to teeth which, owing to their malposition, cannot come into occlusion at all. Thus the terms labial occlusion, lingual occlusion, and infra-occlusion are manifestly incorrect, because they imply conditions which do not and cannot exist.

Protrusion and retrusion as applied to teeth which project beyond their normal arch line or are too far within it, are excellent and expressive terms, while extrusion instead of elevation, and intrusion in place of depression should be adopted because they are equally expressive and derived from the same root-word.

Following this same method of adding prefixes or suffixes to good roots of either Latin or Greek origin would be an intelligent and scientific way of building up a nomenclature both in orthodontia and other branches of the dental art. It may have to be done gradually, for old friends or servants are not readily discarded; but until it *is* done we cannot claim to have a terminology equal to that of other branches of science nor one that can be considered exact in any sense of the word.

Discussion.

Dr. W. C. Gowan, Creemore, Ont. In an admirable way the essayist has called our attention to the relation between the language and the character of a people. This relation is evident in many ways. It may be perceived in the distinctive language or style of sects, professions, or individuals.

The words peculiar to a sect are often an index of the intellectual character or the extent of knowledge prevailing among its adherents. The language of a profession indicates the scientific culture, exactness of knowledge, love of accuracy, and mental habits of those who devise and use it.

As in the case of Shakespeare the language of an individual may be the only evidence we have of what he was. John Ruskin examining the words of Byron, found in them, among other things, abundant evidence that Byron was not the servant of Lucifer.

Exact and well-chosen terms are evidence of clear thought and scientific habit, if not of exact knowledge. The author points out in a most comprehensive and instructive way what constitutes a good term and also the means whereby a new term may best be devised. In fact, he furnishes us a criterion by which we may know a good name when we get it. Its characteristics are simplicity, brevity, euphony, and definitiveness. A name is satisfactory in proportion as it possesses these qualities. It should be derived from one language only. When the mother tongue fails to furnish it, one or more roots from a dead language may be used in constructing a new term which shall possess so far as may be the four qualities just mentioned.

The most essential of these qualities is definitiveness. The best names define with most exactness the things for which they stand. They are best because they are most easily learned, remembered, and used, thus rendering easier the acquirement and use of knowledge. And since utility is the criterion of beauty, terms having these qualities are the most beautiful.

The improvement of dental nomenclature is a commendable undertaking. For it is desirable, since words are an index of character, that ours should indicate that scientific habit of mind and love of exactness which bring success and honor to the dental profession.

However, proper use of nomenclature now available, could it be successfully urged upon the majority, would be equally advantageous to us. I find in this essay no opinion with which I disagree and no argument that I can refute. The examples chosen to illustrate the author's meaning serve that purpose well. I am delighted to have heard the paper, and if I might fittingly offer congratulations to one so much my senior in experience, I would heartily congratulate the author.

Dr. Truman W. Brophy, Chicago, Ill. I want to call the attention of the session to some expressions which have been adopted in dentistry which seem to me in conflict with expressions in anatomy. It seems to me that the dental professors are going to have difficulty over these expressions. For instance, take the word for the tooth of the carnivorous animal, now known as the cuspid tooth, anatomists thinking that a better word than the term canine. But we must bear in mind that we have the fossa called for ages the canine fossa because it is above the canine tooth. Anatomists do not call it the cuspid fossa. And in other particulars we find words adopted by dentists which are not accurate in their meaning. The peridental membrane was in my opinion always a cumbersome expression. I agree with Dr. Guilford that the better term is pericementum. Again, we speak of pyorrhea alveolaris when we refer to a condition of pus flowing from the alveoli. A medical man not familiar with the nomenclature of the dentist might think that the pus was flowing from some other tissue, as the alveoli of the lungs, for instance, and he might suppose that it was a pulmonary abscess. Why should we not adopt the expression paralleling other expressions? If we have an inflammation of the membrane covering the tooth we call it a pericementitis and we know

just where the inflammation is. We do not state whether it is a chronic, acute, or subacute inflammation. If we wish to convey that information we have to use an adjective in addition. So, if we say we have a dental alveolitis we make it clear that we refer to an inflammation of the membrane of the tooth, which may terminate in a restoration to health or a formation of pus which may flow from the alveoli; but pyorrhea alveolaris is in my opinion very unsatisfactory, for it does not mean anything definite. It has been in use so long that we have become familiar with it and that would be the only reason for continuing its use.

Dr. GUILFORD (closing the discussion). As soon as we get a more satisfactory word I think the profession will accept it, but pyorrhea is more than an alveolitis —it is a pyorrhea.

On motion the meeting adjourned until 2.30 P.M., Wednesday.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

Monthly Meeting, December 1904.

A REGULAR meeting of the First District Dental Society of the State of New York was held on Tuesday evening, December 13, 1904, at the Academy of Medicine, 17 West Forty-third street, New York city.

The president, Dr. Hatch, occupied the chair and called the meeting to order.

The PRESIDENT. If there be no objection, we will dispense with the reading of the minutes and all other business, and proceed at once to the hearing of a paper by Dr. E. K. Wedelstaedt of St. Paul, Minn.

Dr. WEDELSTAEDT then read the following paper:

METHODS AND PRINCIPLES OF PACKING GOLD.

Many of the dentists of the West ammoniate their gold, *i.e.* they place their gold in a drawer which contains a dish in which some ammonia has been poured; therefore they have but two kinds of gold, which are known as cohesive and non-cohesive gold.

By cohesive gold is meant gold which is annealed just prior to being placed in a cavity. By non-cohesive gold is meant that the gold is not annealed just prior to being placed in the cavity. Cohesive gold is also known by the name of annealed gold. Non-cohesive gold is also known as soft or unannealed gold.

My essay calls for a demonstration of the use of gold in a cavity in the approximo-occlusal surface of a bicuspid or molar.

There are two methods that are used in which I should like to interest you. The first is an all-cohesive gold method, and the second is a combination method.

The All-Cohesive Gold Method. Let us say that this [demonstrating] represents a mass of gold. Suppose that it is now annealed, and we place it into this convenience pit in the linguo-gingivo-axial angle. Condense it, using the plugger point at the correct angle, and at this particular place having the final condensing against the axial wall. Our convenience pit is now filled, and we are ready to proceed with the operation. Let this represent another mass of gold. In turn anneal this, and then add it to the gold already in the convenience pit. Condense it also. In placing this mass of cohesive gold, I am using the method which I have seen demonstrated time and again. If you will kindly look at this gingivo-cavo-surface angle, you will observe that the fill-

ing covers it about as perfectly as possible. Now add another piece of cohesive gold to that which has been placed in the cavity. Place it beside the piece already in position, and in turn condense it. You will observe that the gingivo-cavo-surface angle is very nicely covered. Let us now add still another piece of cohesive gold so as to give strength to that already placed. Start the condensing of the gold against the axial wall. The moment any pressure is placed against this last piece of gold, you will observe that the gold moves from the cavo-surface angle. The stronger the condensing, the greater is the movement. You can see for yourselves how the gold has moved from the cavo-surface angle. This is the method, however, that is very generally being used by the majority of practitioners.

Remove this mass of gold, and start the filling in a somewhat different manner from that just demonstrated, which will avoid giving us this movement in the gold. Suppose that this mass of gold has been annealed. I have shown you the angle at which the plugger point should be held, and in condensing the gold have demonstrated the stepping of the plugger point according to scientific methods. As before, we will commence in the linguo-gingivo-axial angle, and place piece after piece of cohesive gold upon the gingival seat, until we reach the bucco-gingivo-axial angle. None of the gold placed, however, extends over the cavo-surface angle. On the contrary, there is a tendency to keep away from it. The gingival cavo-surface angle is unprotected, yet we have a good body of gold on the gingival seat and against the axial wall as a foundation for that portion of the gold which we may add that will cover that angle. By following this method, we reduce to a minimum any tendency of the gold to spring or curl when the gold is placed over the cavo-surface angle. The cavo-surface angle should never be covered with gold until a sufficient amount of filling material is in the cavity to prevent the springing or curling that I have just illustrated. The gingival cavo-surface angle, and in fact, all cavo-surface angles, should be approached as has been demonstrated.

The demonstration which I have just given you is not a theory or a supposition. Anyone can prove the truth of what I have done by merely repeating the experiment in glass tubes.

Men tell me that they approach the cavo-surface angle with small masses of cohesive gold, and by this means do make water-tight fillings. Be this as it may, we know definitely that the smaller the mass of cohesive gold used, the greater is the tendency for the gold to spring or curl away from the cavo-surface angle. I follow a somewhat different method myself. In approaching the cavo-surface angle, I use a somewhat larger piece of gold than usual, but I never approach a cavo-surface angle unless there is a substantial body of gold against which to mallet, so as to reduce to a minimum all liability of curling. I am of the opinion that in many cases the failures which we have had can be traced to the poor management in placing and condensing our cohesive gold.

There seems to be a widespread idea which has taken possession of the minds of many men, that there is nothing to filling teeth beyond obtaining a properly shaped cavity. I have heard a number of men say that, if the cavity were properly prepared, how the filling material was placed therein made absolutely no difference. In the use of any filling material the proper placing of that material, the use of correct lines of force, and the stepping of the plugger point are essentials which must be observed if water-tight fillings are to be made.

Combination Fillings. I feel that equally good results can be obtained where combination fillings of cohesive and non-cohesive gold are made in cavities which we fill in the approximo-occlusal surfaces of molars and bicuspids. There are two methods which I shall demonstrate for your consideration.

The first is the Black method. After the cavity has been prepared, the width of the gingival seat, linguo-buccally, is obtained. A pair of dividers are introduced into the cavity and their blades are

extended until they extend into the gingivo-axial angles. The dividers are then removed from the cavity and a sheet or half a sheet of No. 4 gold is folded, a little broader than the width of the seat from the axial wall to the gingival cavo-surface angle. The gold has been folded into a ribbon. It is then wound around the divider points and we have, as a result, an oval-shaped cylinder, which should just fit the cavity. The cylinder is not annealed. One end of it is grasped and placed into the linguo-gingivo-axial angle, and it will stand in the tooth at about the same angle as this cylinder. It should now be forced into position, and the half which extends toward the axial wall should be condensed. If the condensing be carried beyond the axial half of the gingival seat, the cylinder, not being supported, is likely to be forced from the cavity. Cohesive gold is now placed on that portion of the cylinder which has been condensed, just as though it were the gingival seat. As the cohesive gold is added, it should securely lock the cylinder in position. As soon as this has been accomplished, the malleting can be carried on to the non-cohesive cylinder until it is thoroughly condensed. As a rule, the non-cohesive cylinder is only condensed a trifle ahead of the cohesive gold, until the entire cylinder has been covered with cohesive gold.

The next method of combining cohesive and non-cohesive gold differs somewhat from the one just demonstrated, for the reason that three and very often four cylinders of non-cohesive gold are used instead of one. Let this cylinder represent one-quarter of a sheet of No. 4 gold. This cylinder is placed in the little convenience pit in the linguo-gingivo-axial angle. Just that portion of the gold in the convenience pit is condensed. Let us say that this second cylinder has also been made from a quarter of a sheet of No. 4 gold. In turn place this cylinder in the bucco-gingivo-axial angle and condense it. This is a larger cylinder, and contains one-half sheet of No. 4 gold. It in turn is placed against the cylinder already placed in the linguo-gingival portion of the cavity. This fourth cylinder contains half a sheet of No. 4 gold and it is placed here, between the others, and thus keys the mass in its position. These cylinders are never annealed. They are condensed to one-half the width of the gingival seat, and then let alone until they are locked in with the cohesive gold. Step by step, as the cohesive gold is placed, the non-cohesive gold is condensed. You can readily see that if the condensing was carried entirely over the cylinders without first locking them in with cohesive gold, they would be forced from the cavity.

A second layer of cylinders is never used. Should more than one layer of cylinders be used, I should be afraid of their sliding one on the other when direct stress was exerted upon the filling. I am well aware that a number of essays have recently appeared in which the writers assert that a matrix should be placed around the tooth and the entire cavity in the approximal surface filled with non-cohesive gold. I cannot indorse any such method. Non-cohesive gold has its place just the same as has cohesive gold, and an intelligent person does not any more confuse the use of these two golds than he confuses the use of chisels and pluggers.

I am a firm believer in the use of a limited amount of non-cohesive gold in conjunction with cohesive gold, not only in the cavities in the approximo-occlusal surfaces, but in the cavities which we fill in other surfaces of bicuspids and molars. Non-cohesive gold in the hands of the ordinary practitioner is a material which will bring him success, and that in the majority of cases where he would be likely to have failure ensue from the use of cohesive gold. I do not believe that there are many men in the dental profession who can fill a cavity in the distal surface of a bicuspid or molar with cohesive gold, and make a water-tight filling. I am fully aware that the majority of men who do not use any cohesive gold have an idea that they can and do make water-tight fillings, and I feel very certain that if some of these men made fillings in glass tubes and tested them, their ideas regarding their skill would receive somewhat of a shock. Recently

I was compelled to make an all-cohesive gold filling in the distal surface of an upper right first molar. I am perfectly willing to acknowledge that on completion of the operation I was very far from being satisfied. It was not possible to use any non-cohesive gold in the case just mentioned. If we would but take glass tubes, and see the differences which exist between the fillings made of non-cohesive gold and those made of cohesive gold, there would be little use for any man to say anything further about this subject.

Some time ago I saw some fillings which Dr. G. V. Black had made in the approximo-occlusal surfaces of molars and bicuspids. I made a note of the fillings, and wrote Dr. Black for the record and the method he used in making them. He answered my letter, and in return sent me a record of the operations. He stated, among other things, that the fillings were combination fillings of non-cohesive and cohesive gold. Those fillings were made thirty-five years ago, and they looked as if they had been made within the past week. It is very true, we cannot all be Blacks, but at the same time, it is a question whether or not we should have recourse to a method which greatly simplifies an otherwise very difficult operation. I am fully aware that one of the most difficult operations I am called upon to make is to fill the gingival third of approximal cavities in molars and bicuspids with cohesive gold.

For several years I have kept more or less of a record of the thickness of the non-cohesive gold that has been placed in the gingival third of cavities in the approximo-occlusal surfaces. I find that in the majority of cavities the non-cohesive gold measures but a millimeter in thickness. Occasionally it is 1.5 mm. This is what I should call a limited amount of non-cohesive gold.

Discussion.

Dr. G. V. Black, Chicago, Ill. My interest in this subject of packing gold is perhaps as great as my interest in other subjects in dentistry; but I wish most to speak of the matter of formulating our methods. If a man is to put on a piece of rubber dam over a certain number of teeth, he should know when he glances at a case the exact steps he will take, and he should be able to convey that to another in words. If a cavity is best prepared with certain instruments, the man who is speaking of that method should be able to tell his audience in words that the audience shall understand, the exact instruments to be used, so that it would become perfectly apparent that it is that particular instrument—not another—and formulate the methods of using that instrument. I might go on through a long list of subjects in which this formulation should be made complete, so that we could speak to each other in words which we would mutually understand.

This is the object of dental nomenclature, of course; and the farther we carry it, the simpler it becomes. With teachers particularly, we find that the farther we carry our nomenclature the better our students understand us, and so it will be with the whole dental profession.

In order that we may have a nomenclature covering such subjects as the one presented to us this evening, so we will readily understand what is meant by the speaker, it is necessary that every step be formulated, and a plan given by which the work is accomplished—step by step. I cannot write to the profession as I would love to do today, for the reason that our nomenclature is insufficient. We are lacking words. This being the fact, it becomes difficult for many of us to understand such a lecture as you have had this evening. There will be points in which you will misconceive the speaker's meaning, and carry off a false idea of points which you have not understood, and consequently you have not received the full benefit.

This is cured finally by the formulation of plans, as you have seen here to some extent this evening. This I regard as the most important feature to be developed in the near future, for the good of dentistry, and for the good of our people through dentistry. We have no

right to an existence as a profession, except as we become enabled to do good to our people. That is what we are for.

This plan of using non-cohesive gold is not new. I suppose many in this audience are using it; perhaps most of you. I hope you are. What I may say about it after what has been said, may be of less importance to you than calling your attention strongly to the matter of formulating our expressions, so we may understand each other. For instance, as to the cavo-surface angle, say cavo-cavity surface of the tooth, and it cannot be mistaken. A student rarely misses that after once having it explained to him; so we want to carry this to every detail of dentistry, that we may understand each other, and not have the differences we sometimes have, that arise from misunderstandings.

As Dr. Wedelstaedt has told you, never step out on to the gingival margin until a wall of gold has been built standing at an angle of 45° against the axial wall and against the gingival wall; then if the work be carried on carefully, no black ditch around the filling will result.

That seems to me easily understood. If you are anxious to use non-cohesive gold, after this part of the filling has been built you can lay a piece of non-cohesive gold that will come over the cavo-surface angle, building the cohesive gold against it, and carrying it around the entire margin, if you should care to do so. Then I would also say, practically, after placing it always condense the non-cohesive gold by condensing cohesive gold over it. That should be the rule, and that rule is applicable wherever non-cohesive gold is inserted, except, of course, when making a filling entirely of non-cohesive gold. That is entirely a different proposition. I suppose there are not many men here tonight who have really learned to make non-cohesive gold fillings as we used to do before we had cohesive gold. The instruments for it are not in the market. It seems to have passed out, yet there are a few of us old fellows who love to do it yet, particularly for young children. It can be done quickly and perfectly in some of those cavities.

I do not know that I can add much to this presentation. I can only give you the idea that the methods presented are largely methods that I follow and that I teach. If there are some words cropping out that you do not understand, I trust there will be some formulation of the definitions, so you will understand them. Our students sometimes increase our nomenclature, suggesting words that are appropriate for a thing heretofore unnamed, and while I do not wish our dental literature to be flooded with a multitude of words for any one thing, I would like to see a much further development of dental nomenclature along right lines.

Dr. R. Ottolengui, New York. I am very glad that Dr. Black has spoken, because it gives me something to discuss. I must confess that I was in a quandary when Dr. Wedelstaedt came to the end of his paper. He spoke mainly on two subjects, one of which I know nothing about, consequently it would be manifestly wrong to say anything about it—that is, non-cohesive gold at the margin. The other was about packing gold practically as I suppose we all pack it. So—as I thought—he left nothing to discuss; but Dr. Black has brought us to the subject of nomenclature.

I had the temerity to ask the meaning of the term "cavo-surface angle." Not that I did not have a suspicion that I know what it means, but I had more than a suspicion that there were some present who do not know, and I am going to give my reasons for that. We have been taught, especially from the Northwest, to make a flat seat with upright walls, and this makes two angles, the labio-gingival angle and the linguo-gingival. The lecturer started by putting some putty in the corner of a plaster tooth. Geometrically that was one angle, and when he spoke about building things over the angle, we had a right (some of us) to think possibly he was talking about that angle, because that is an angle. Of course, the edge is also an angle, and we have now been told that it is the cavo-surface angle. I have always thought that it was the margin of the cavity, and I do not see any particular reason for changing the name.

I do not see any particular advantage in saying the cavo-surface angle, and I will tell you why. This is a surface certainly, but all the rest is a surface, too. So you ought to call it, if you are going to be very exact, the cervo-cavo-surface angle. We are worse off with these terms. A wit has said that words or language were invented by men to conceal thoughts, but scientists use words to convey definite meanings. There has sprung into existence a large list of hyphenated words, many of which do not convey ideas any more clearly to the mind than did the words that were used formerly for the same thing. I do not mean that we should put out all these hyphenated words. Some of them of course are very useful, but cavo-surface angle does irritate a little.

I have often thought a certain thing. I have written it, and Dr. Wedelstaedt has not answered it. If we are going to have a definite nomenclature, and I ask it a little in the interest of the editor, why should we have "proximate" cavities, "approximate" cavities, "proximal" cavities, and "approximal" cavities? Is it not time we should determine just exactly which of these words to use? The thing was threshed out long ago by Dr. White, an eminent editor, who wrote an editorial which absolutely finished the argument, proving that *the* word to use is "approximal." All the medical dictionaries say "approximal" for cavities in the teeth. You cannot find such a definition for "proximal" in any dictionary I have been able to discover.

Dentistry is supposed to be a part of medicine. In the medical world "proximal" has a definite meaning. It is the opposite of "distal," and yet we hear of disto-proximal cavities—that is to say, the "farthest-nearest" cavity!

Approximal has exactly and only the meaning that the dentists wish to convey when talking of a cavity between two teeth; and so I make this little appeal tonight for some of the old terms. Let us not change them. It is the same with that dreadful disease, pyorrhea alveolaris. A lady came into my office once and asked me what she had, and I told her. She said: "Thank the Lord I have found someone who has told me something that one other dentist has told me." She had been to nine different dentists before me, and each one had given her a different name for her disease.

I know only one way of packing gold, and that is solid. In the beginning of my career I packed it with an automatic mallet, and I packed it solid; then I went at it with a hand mallet, and with the help of a lady assistant, packed it solid; then I used a foot engine, a Bonwill mallet, and then the electric mallet, and I pack it solid. My idea is that it is the man, and not the method, that fills teeth.

Dr. B. Holly Smith, Baltimore, Md. I have the distinguished pleasure of being present at Dr. Wedelstaedt's invitation. We have been good friends I think nearly all our lives, and I wrote to him to ask about what he would say. He said, "You know all about it, old boy; just go ahead." I often recall the title of a book in my father's library, which read something like this, "Some martyrs not mentioned by Foxe," and I feel that Dr. Wedelstaedt's name should be in that book; for if there ever was a true and generous soul, who went about through different communities preaching and teaching for the elevation of his profession, and for the benefit of humanity, I regard Dr. Wedelstaedt as that soul.

There is one trouble about him. He is something like a rabbit. You never know which way he is going to jump, and unlike a cat which always lights on its own feet, you never know whose feet he is going to jump on, and about half the time it is either Ottolengui's or Rhein's! (Laughter.)

I regard the gentleman as perfectly capable of taking care of himself, but what he has told you about packing gold, I think I did when I was a freshman student.

I do not think he claimed any new principle except as to this "cable slot" or point of convenience, as he calls it.

I would not get away from the very important work of properly packing gold. I could talk from now until Christmas about packing gold, but I have no idea

of talking about it at all. There were so many other things brought in.

Dr. Ottolengui talks about packing gold solid. I do not believe that solid gold—unless you have it in your pocket—is always the best. I do not believe it is the best always to have it solid. If it is comparatively solid enough to exclude moisture and extraneous substances, I think it is sufficient. Non-cohesive gold has been a very good friend of mine, and I would no more see it derided or made little of than some of the brave men who fought the battles of yesterday in our profession. Much has been said and written about non-cohesive gold that might have been proved by some kind of machinery, but not by actual clinical experience.

Dr. Wedelstaedt in his advocacy—or rather elaboration, I might say—of some of the theories of Dr. Black in the preparation of cavities and introduction of gold, has done the profession of dentistry a very great service. I cannot say that Dr. Wedelstaedt has always been perfectly fair and plain with me. I have talked to him about some matters of interest that we ought to have known about, and he always says, "It's all right; you understand all about it." I think the doctor does himself an injustice in this sense, that he is not sufficiently clear, that he does not give the reason for the hope that is within him.

However, I want to commend his work generally—to say that I am proud of him as my friend, as the elaborator and defender of some principles that have been of incalculable benefit to the profession.

I would say something in objection to some of the plans of describing cavities. I do not think Dr. Ottolengui has any right to object to a hyphenated name. Dr. Ottolengui has no right to make those references, because I think the work some of our Western friends have done in compounding words to describe exact cavity location has been more than helpful to us. I have no objection to that "cable slot" if you will first bring it before the National Association's committee on Nomenclature.

Dr. S. G. Perry, New York. Dr. Royal W. Varney, in the early seventies, I think, first made that subject of cavity preparation plain. Not by any article or discussion, for it is not on record as far as I know, except in a short article which occupies less than a page; yet his method of preparing cavities was most complete in all its details. He advocated straight instruments. Of course that required the opening of cavities in such a way that they could be reached with those straight instruments, but not so as to weaken the tooth more than could be helped. Even in small cavities, he made his fillings so that when the teeth came together after being wedged (and that was the way he filled the molars and other cavities—by liberal wedging) the fillings had free margins. Down near the gum line on both sides, instead of cutting his cavity to a sharp angle, as here shown, he made a curve. See the curves in the architecture of this room; you will remember the curves in the natural formation of the cavity. He followed for the most part the idea of the curve, and while he very often cut out to the gum freely on both sides to get a free exposure there, he did not cut to the square corner, as we see here. I think such cavity preparation was not known at that time.

If I were to undertake to criticize the preparation of the cavities here shown the objections I would make would be two. In the first place, I would not cut them to a square angle near the gum. I should undertake to cut well out, so as to be sure to have the free edge of the filling along that vulnerable surface on both sides. I should cut it with a curve with less discomfort to the patient, and I should not open it quite so freely, because I should feel I was destroying too much tooth-structure. The "cable slot" I should not cut, nor should I make it a part of the retaining portion of the filling.

I should keep to the old style of cutting a little groove on the sides for partial retention. As to the little grinding-surface fissure, let me stop for a moment and call your attention to another fact. If there were not a deep cavity there, there must have been only a slight fissure,

and I would have cut that seam only enough to fill it so as to calk it. I should depend on a little groove on each side to retain the filling without cutting a groove across the cervical border. I can easily find means of packing soft or semi-soft gold so I should have no fear but that the fillings would stay in place.

Dr. Varney's method of filling, as I said before, was to open the cavity freely. He was a silent teacher; he said but little, but his example was always eloquent. His own set of instruments were very beautiful, all designed for the use of the lead mallet in his own hands, or in the hands of the assistant. I followed that method for many years, and I have not seen the signs of discoloration around fillings that are so generally spoken of. I have seen many of my old fillings coming back not showing those signs, though they had been in twenty-five or thirty years. They were done for the most part with the straight instrument. In the later years of my life my method has been not to cut so freely, and not to use so much cohesive gold, but with as great certainty of making a tight joint. It is not the solid filling Dr. Ottolengui speaks of, nor the cohesive gold filling, but it is the tight filling that saves teeth. It is the man who makes the tight filling that is successful. So I will save my patient all the pain I can, and I will open my cavities with as little cutting as is necessary to get correct margins. In large cavities, rather than pack a great mass of gold, I would put in the bottom oxyphosphate, and leave the tooth when I am through so that there would be more strength and less display of gold. Contour fillings, and large fillings of any kind whatever, can be made very beautiful and very serviceable in that way. As I grow older I like to see teeth without any fillings. I want to make the fillings as small as I can, and I would rather cut the teeth less and weary my back a little more, in making a tight fit, leaving as much of the natural tooth as I can.

If you will use soft or semi-soft gold foil for packing against the surface of the cavity, and if you will be observant and watchful, firm and steady in your work, you can make gold fillings in any surface so that the years will roll on and you will not see the dark lines.

If I can make my approximal fillings as small as can be, then I have worked to the extremity of my desire. I am disinclined as I grow older to cut and slice the teeth, and with that wonderful instrument, the dental engine, which is a blessing but a danger, it is a very common thing in my judgment to see teeth whittled to pieces more than they should be. I have too much reverence for the natural teeth to put a heavy hand on them. I would rather go about it in another way than in such a radical and strenuous manner. This would seem to be a sort of reflection on Dr. Wedelstaedt, or upon his system, but I do not want it understood in that sense. I am speaking of this from my own standpoint. I know the method prevails in the Northwest and the West, and somewhat in the East, too, for some of the colleges teach it. In the University of Pennsylvania, where I lecture every winter, I see some teaching in this direction—not quite to the same extreme, but the idea prevails, and the only quarrel I have in life with my blessed friend, Dr. Darby, is on that point.

Those of you who see my fillings, the good and the bad—and the Lord knows there are plenty of bad ones, for I am too overworked to always work up to the standard I would like to follow—know that I do not prepare my cavities quite in that way, and I want Dr. Wedelstaedt to convince me of the truth of his system, for I am always open to conviction.

In reference to soft gold, I do not care how many years roll by you will all come back to the idea that the softer forms of gold are best suited for the teeth. Wherever it can be used, there it should be used. You are more certain with it of getting a close fit—what Dr. Dwinelle used to call calkage.

I want to repeat that I do not wish to censure or to criticize this method of the preparation of cavities, because the cavities can be most accurately filled. The matter of placing cylinders is simply without fault—I could not criticize it. When the operation is completed, it

is as perfect as it is possible for human hands to make; but can such fillings not be made perfect enough for all practical purposes to save the human teeth without so much cutting?

Those who have seen Dr. Wedelstaedt's fillings must know how fine they are, and must know how much in earnest he is in this matter, but I must say I cannot go quite so far in cutting my cavities.

Dr. R. H. Hofheinz, Rochester, N. Y. I am extremely sorry that Dr. Perry was not present yesterday, because the remarks he made this evening would have been—I will not say more in place, but would certainly have evoked more discussion; and I regret, as I think all regret, that Dr. Perry did not make those same remarks in relation to extension for prevention, which was the subject of last evening.

What Dr. Wedelstaedt said of cohesive gold, namely, that it would shrink away from the cavo-surface angle, is correct, providing he manipulates cohesive gold in the manner he demonstrated. There is no reason for cohesive gold to shrink from the cavity margin if properly condensed. What would become of small, delicate contour fillings, which frequently must be started from a small retention? Soft, or non-cohesive gold, needs one kind of manipulation; cohesive gold an entirely different one.

I read last night, in my discussion of Dr. Black's paper, that I packed five sheets of soft and cohesive gold in fifteen minutes at a clinic I gave in 1887 at the Medical Congress in Washington. It is a human impossibility to pack that amount if it is all cohesive gold. It must have been an extremely accessible cavity; a very small amount of cohesive gold in those days was used, perhaps at times not more than one millimeter of cohesive gold in connection with soft gold cylinders. I have fillings in my own mouth which were made by a disciple of Dr. Frank French of Rochester, about twenty-nine years ago. They are as intact as when they were first put in, which is good evidence that soft cylinders and soft gold fillings in combination with cohesive gold, if made correctly, can be made to last as well as those made of cohesive gold, providing correct judgment be used in the selection of cavities. I have been brought up and nursed in this method, but I have drifted away, and I employ today the electric mallet as frequently as non-cohesive cylinders. Anterior teeth I used to fill with soft cylinders in combination with cohesive gold, but I have seen many failures coming from the wedging of soft gold into these delicate cavities of anterior teeth.

Regarding the ability of Dr. Line, of whom your president questioned me, I can only say that he is a disciple of Dr. L. D. Walter, who was the most wonderful manipulator of non-cohesive gold I ever knew.

I have for years placed my cylinders in the manner illustrated here. I have found, however, not only in my own fillings, but in those of some of the men who have done exclusively soft cylinder work, that at the center of the cervical margin—if at any point—there came a small leakage, and not at the bucco- or linguo-cervical angles, as we usually find in fillings which failed owing to an insufficiency of extension. We cylinder men always squared the seat of the cavity owing to its necessity for the placing of the cylinders correctly. I thought perhaps we could not drive the center cylinders home sufficiently well to get a precise contact with the cervical wall, and I have made this modification:

I have used what tonight for the first time I have heard called Dr. Black's method—that is, placing one cylinder against the cervical wall, slightly condensing that and extending it beyond the cavo-surface angle and then placing those three cylinders in somewhat this manner: [Illustrating.] This avoids any possibility of an imperfect condensation against the cervical wall. When we cylinder men filled all these cavities with soft cylinders, we filled them practically within one millimeter of the occluso-cavo-surface angle, and finished the rest with cohesive gold. I would not think today of filling such an extensive cavity as that with entirely soft gold, because as long as you have buccally and lingually

such an amount of exposure I think that only the minimum amount of soft gold should be used, and the rest of the filling should be condensed with cohesive gold.

In the clinics today, I saw Dr. Rhein not only put in at the table an entirely cohesive filling with the electro-magnetic mallet, but I saw the work in the mouth of his daughter. I saw Dr. Searl make an operation in a similar cavity. I believe Dr. Rhein's work is excellent, and I believe Dr. Searl's is equally so; I do not think there will be any difference in the lasting capacity of their fillings. While I am a sort of a compromise man in these fillings, I see no reason why strictly cohesive fillings cannot be made to last as well as fillings such as I make —as Dr. Searl makes, and as Dr. Wedelstaedt has so eloquently told you tonight he makes. It depends upon the individuality of the operator. It is not the question of how, or what kind of gold we use; I think it depends entirely on the individual conception of mechanics and upon the individual conception of how to manipulate gold in those cavities. Dr. Searl probably could not put in the same filling Dr. Rhein does, because he is not in the habit of using the electric mallet. Dr. Rhein would perhaps not be able to do the same work as Dr. Wedelstaedt, or Dr. Searl, or I do; but the lasting capacity of each man's operation is equally good, providing the operator is equally good. It is the individual method, and if that be brought to perfection it makes no difference who the operator is.

Dr. Ottolengui. You say you only use the soft or non-cohesive gold at the gingival step. The rest of the cavity you make with cohesive gold?

Dr. Hofheinz. Usually I place my cylinder on the Black system, as Dr. Wedelstaedt calls it, with the cylinder extending beyond the cervical margin. I do not condense this home with all the pressure I can bring to bear. After I am through with that I place my cylinders not in the way Dr. Searl has done, but lengthwise. I have thought, in thus protecting the cervical wall, that should there be a trifling space between this layer of gold and the center cylinder, it would make no difference. I mallet in the same manner, by condensing the center cylinder and getting the pressure from the center against the margins, the natural way soft gold will expand. In exceptional cases I have only filled the gingival step, as Dr. Ottolengui calls it, with soft gold, and the rest with cohesive.

Dr. Ottolengui. If you have done that, have you not made all of your other margins tight?

Dr. Hofheinz. Yes.

Dr. Ottolengui. Then why could you not make this margin tight?

Dr. Hofheinz. I certainly could, but with much more sacrifice of time. Soft gold can be condensed in much greater thickness against the cervico-cavo-surface angle, and thus render the same service in the minimum amount of time. I have used this method where I apprehended trouble from too much metal in proximity with the pulp, and have used oxyphosphate of zinc to keep the cervical cylinder in place, thus also protecting the pulp with the more neutral material.

Dr. John I. Hart, New York. Dr. Wedelstaedt and Dr. Black must find it extremely gratifying to hear so little objection made to their position. It was my privilege to preside at a meeting held by this society some nine years ago, when Dr. Wedelstaedt brought before us the ideas which prevailed only in the West at that time, but which are today so largely accepted in the East. Dr. Wedelstaedt will no doubt remember the hornet's nest he raised about his ears at that time. Today the theories are accepted. They may be modified to an extent, but the practice is largely the accepted practice of operative dentistry today.

What is our object in filling teeth? After saving the pulp, we desire tight joints, and finally our object is to restore the lost contour. Non-cohesive gold will make tight joints. Dr. Hofheinz has given evidence of that, and you have all seen evidences of it in your practice. You have seen fillings made with non-cohesive gold that have stood for years, and they have saved the teeth. But they

do not, if the cavity is extensive, permanently restore the contour; but a combination of the two will make tight joints and will restore the contour. Why not use the combination then? I do. As to annealing: Dr. Wedelstaedt cites the placing of cohesive gold cylinders in a drawer with ammonia, and allowing the gas to collect on the surface of the gold, and destroy temporarily its cohesive properties; but there is a gold made by one of our manufacturers which you can anneal until it is cherry red and you will not bring forth any cohesive properties, and that is the non-cohesive gold I prefer. I want to be sure when I join the cohesive gold with it, that I obtain perfect interdigitation, so I get a union between the two. No mechanic would think of joining two hard surfaces without some intermediary which would assist him in making a tight joint. We see the improved window-frames with glass meeting glass, but there is a slight film of putty there to give a tight joint. I would not think of running the non-cohesive gold up any distance. If it is run up far there is a danger if the force of mastication be extreme, of driving that cohesive gold and breaking the continuity of the filling; but if we use it for the purpose of obtaining a joint we do obtain a tight joint.

When one layer of cohesive gold is pressed upon another you get a union of one or as many layers as you have, and when you convey these layers to an inaccessible portion of the cavity, you prevent, if you are using cohesive cylinders, the possibility of obtaining the softest quality of the gold; but if you use non-cohesive you get the qualities you desire. If you want an electric-light wire that you can place where you want it, why do you use one made of several strands instead of a single wire? Because it is more flexible.

Dr. Wedelstaedt will see I largely concur with his method of practice, and yet I think he was begging the question when he said a filling made of cohesive gold and built from this corner of the cavity in the manner he described, would break away from the cavity because he built from an apex instead of a base. While I thoroughly concur with the method he has suggested, I think as Dr. Hofheinz has said, that the gentlemen practicing the other method can achieve success, but not in the manner he described, because instead of building from a base they were building from an apex. I feel deeply interested in this matter, but I will not talk longer, as I do not want to be selfish.

Dr. M. L. Rhein, New York. I agree with Dr. Hofheinz that there is more than one way of reaching Rome, and there is more than one way of making a permanent gold filling. There is a vast distinction to my mind between the merits and demerits that may exist in a gold filling depending on the position in the mouth in which it is placed. I made that difference patent when I presented the initial paper, I may say, of this two-year discussion before the Academy of Stomatology, in Philadelphia, on approximo-occlusal cavities in posterior teeth, in distinction from those of anterior teeth, because the point I wanted to bring out was the point Dr. Black has so often brought to our attention, the strain of mastication upon posterior approximo-occlusal fillings. I leave it to the opinion of the majority of the profession, if they review in their own minds the numerous fillings of this class that come under their observation, if they do not notice the effects of this mastication in a large number of such fillings. It is for that reason that I stand for the assertion that in those cavities described by the essayist this evening we require the greatest specific gravity in the filling material introduced if we want the greatest durability.

There does not seem to have been any difference of opinion between the essayist and myself on this point, but the difference seems to have arisen as to the best means of producing the highest specific gravity. As I understand it, the essayist has always claimed that with cohesive gold it is impossible to produce a specific gravity of the filling material that would be as great as that obtained from the use of the combination method he has used. This is a difficult matter to discuss, because at the beginning of the

paper the essayist remarked to the stenographer that it was not necessary to take any remarks, as his paper was written out. Having spoken extemporaneously, if he has memorized it, well and good; but I have a lingering doubt in my mind as to whether the remarks made by the essayist are precisely the words that will be found in the written paper, and personally I take serious objection to discussing a paper presented in such a manner before such an audience.

In making these remarks about the results of stress against the filling, I want to say, with some hesitation, that it is necessary in the discussion of such a subject to bring in the personal side to some extent. I presented a method of operation yesterday and today—yesterday in the mouth and today at a table clinic—the latter of which I consider the most preferable method of demonstrating to men who have been in practice for some time. One principle I demonstrated is precisely what the essayist has endeavored to demonstrate this evening by his method, and that is the necessity of obtaining a secure anchorage before attempting to build up the filling. Today at my table clinic, I tried to make clear to the numerous people who watched me, those facts that the essayist has in the journals contradicted, stating that such things could not be done; and those of you who saw me can bear testimony to the fact that I did do those things that he claimed could not be done. Looking at the exaggerated model of the essayist, I want to say that these angles—the bucco-gingival and the linguo-gingival angles—are much straighter, much more of a right angle in this model than the wash pictures presented last evening by Dr. Black; they show much more of a right-angle on the same line. All the remarks are more extreme than we listened to last evening from Dr. Black.

If you will bear in mind the wash picture of Dr. Black, showing the finished filling, you saw at these angles a decided curve in the filling, such as Dr. Perry said was his preference. I regret Dr. Perry did not see the pictures last night, because they showed the curve that I like to have there, for the reason that my entire idea in preparing the margins (and I indorse my friend Dr. Ottolengui's choice of the use of that word) is to preserve as far as possible the permanent integrity of the enamel rods as we have learned to understand them. For such reason, at this angle there should not be this abruptness, because in this way we endanger the enamel rods. I believe in polishing the bevel at the enamel margins around the entire cavo-surface angle, if they choose to call it so, for this reason: By polishing these surfaces as finely as possible, you remove the most dangerous cause of secondary caries that exists, and that is, the slightest cleavage of almost microscopic portions of the enamel rod that remain there. I also demonstrated the ease with which the gold can be packed on to the enamel surface.

I want to say a word to Dr. Hofheinz in regard to the reason he gives for preferring soft gold non-cohesive cylinders on the gingival floor. I tried to demonstrate to him the lack of necessity for non-cohesive gold. I endeavored to show with the electric magnetic mallet, with the greatest force I could get from eight volts of current, with a heavy blow, the impossibility of doing any damage to the frailest part of enamel on a tooth that has been in plaster, and on which I demonstrated in Philadelphia two years ago in February—a tooth which is dry and has been knocked around the printing room in Philadelphia—the impossibility of doing any damage to that tooth-structure as long as there was a layer of gold acting as a buffer between the plugger and the tooth-structure. I admit that the moment a plugger is used directly against the tooth-structure, you will injure it. All damage that ensues is caused by faulty manipulation. I do not want to excuse myself on that score I do not claim that I do perfect work, although we all may try to do it; but whatever faults may be found in my work I believe are due to the imperfection of my manipulation, and to my own neglect, which could have been avoided. The fault is not due to the method. In fact,

the trouble with the essayist is that he does not understand the true technique of manipulating cohesive gold. Any of our recognized cohesive gold men would see this in watching the clinic of Dr. Searl.

I desire to state the method pursued in making the initial anchorage, and in this I claim every advantage claimed for the porcelain inlay. A film of properly spatulated cement is placed over the inner cavo-surface, care being taken that it should not reach the enamel margin. A suitable piece of S. S. White moss fiber gold is annealed and placed in the soft cement and gently burnished over the entire surface of the cavity so that when this burnishing is completed it closely resembles a gold matrix, only it is firmly cemented into place. This gold is molded into position with the same delicacy that Dr. Hofheinz lays his first cylinder on the gingival seat.

Dr. HOFHEINZ. Do you place it directly against the cervical wall?

Dr. RHEIN. Against the gingival seat and the axial wall. In very large operations I stop at the lower third, because in a filling of such magnitude I do not proceed any further than the gingival third, and then polish that portion of the filling. At the next sitting a layer of cement is placed on the occlusal step and in this cement is placed the same kind of lining of moss fiber gold, in order to obtain the advantages that accrue from the inlay as it is cemented in position. The cement having hardened, we have an anchorage that can be depended upon better than the eye of any human being—better than Dr. Searl's eye with his magnifying glass added to it—because we know the cement holds the matrix of gold immovable. How often have you seen a fine operator put in a leaky filling because he could not detect the almost microscopic movement of the gold that took place when the filling was started? Follow the cement technique and such movement is an impossibility.

The cement having hardened, that is after the lapse of a few minutes (which can always be advantageously used in finishing some other work), strips of annealed rolled gold, Nos. 30, 60, 90, or 120, are malleted directly upon the cemented gold matrix, with which it forms a homogeneous mass.

I agree thoroughly with Dr. Black that the cavity should be convenient, so that the gold can be malleted directly and with rapidity, and for that purpose, if there are any little places on the inner walls—any of the grooves Dr. Perry has spoken of—now is the time to fill those so as to make the form of the wall as straight as possible. All grooves or undercuts having been obliterated by filling material the gold is now built up as flat as possible from the gingival seat, always allowing the plugger to advance slightly on the approximate angles. With the mallet used in the way so beautifully described in Dr. Webb's book on operative dentistry, the gold can solidly and homogeneously condensed be brought to the surface in a space of time infinitely more rapid than by the methods understood in the Northwest as the proper technique of using cohesive gold.

All who have watched the clinics of Dr. Searl and myself could not fail to be impressed by the rapidity and smoothness of the condensation of the heavy rolled gold strips under the blows of the electro-magnetic mallet, as compared with the slowness and pitted uneven surface left by Dr. Searl with gold pellets packed with fine-pointed pluggers and malleted by an assistant.

Dr. WEDELSTAEDT. The discussion of my ideas is most disappointing. I am very glad that the readers of our dental journals will know that the discussion took place among the men in the East and not among those who live in the West, where somewhat different ideas exist from those expressed here this evening.

I came here and talked to you of methods and principles of packing gold, demonstrating very fully and giving you the reasons for using certain methods. I also demonstrated what resulted if no attention were given them. Scientific and unscientific methods were very fully explained and also demonstrated.

The discussion has amused me. It has

amused me for the reason that it can be likened to a man who, after delivering a lecture on modern history, has the pleasure of hearing those who are discussing his ideas dwell wholly upon subjects which are connected only with ancient history. The same thing is true regarding the discussion of my ideas.

The different things to which I have called your attention are not based upon ideas. They are based upon the results of the experiments which Dr. G. V. Black and others have made. The results of these experiments can be proved by anybody who is interested.

The statement that all there is to the whole subject is to make our "gold fillings solid," is all very well so far as it goes. I agree with that portion which says to make the fillings "solid," but solid fillings do not always fill the cavity so perfectly as to make tight margins. This afternoon, I saw a number of very beautiful fillings in the teeth of a patient at the clinic. They were solid masses of gold, but there was a black ditch around every filling. Had the operator known how to make tight margins with his cohesive gold, the black ditches would not have been there.

Dr. B. Holly Smith says, that there is nothing to this subject but what every freshman dental student knows. Had he placed his words like this, "that every freshman dental student *should* know," I would take much pleasure in indorsing his remarks.

My observations, not only at this clinic but every clinic which I have attended, teach me that this subject of handling cohesive gold is not very well understood by either teachers or practitioners. It is not understood for two reasons. First, that very few men are interested in it, and second, not many men have an inclination to spend any time in studying the subject or in making the experiments. The main thing seems to be to fill the cavity in the tooth, not "how" it is filled, but just so that it is filled. I do not believe in following such methods. There is a right and a wrong way of filling teeth —I believe in following the right way.

I wish to present my compliments, as well as thanks, to Dr. Hart for his words of encouragement.

There remains then but one thing more to say anything about, and that is anchoring the first pieces of gold placed in the cavity in a mass of soft cement. The results of the investigation of the cements were published some eight years ago. The contraction and expansion of cements was somewhat discussed, as well as a number of other conditions pertaining to this subject. The whole subject was very thoroughly discussed at that time. Recently it was gone over again. Cement is not dentin. There is as much difference between the two substances as there is between gold and glass. Not in any sense of the word is there any similarity between them. The molecules in cement are held in high suspension, the same as they are in glass. Now just the opposite is true of the molecules in dentin. They are held in low suspension. Drop a slab of hardened cement on the floor and it fractures; drop a piece of dentin the same size and it may bend, but it instantly resumes its normal shape. Cement is a fragile, friable substance, whereas dentin is quite a resilient substance. The difference which exists in these two substances should not be confused.

If we wish the best results to follow our operations, and are making dental operations for the purpose of preserving the human teeth for the greatest length of time, then we should seat our filling material upon dentin and not upon a mass of soft cement.

On motion a very cordial vote of thanks was given to Dr. Wedelstaedt, and to the clinicians who so kindly favored the society yesterday and today

Adjournment.

B. C. Nash, *Secretary.*

Report of the Clinic Committee.

Your Committee respectfully reports that clinics and an exhibit of dealers and manufacturers were held in the Grand Central Palace, Forty-third st. and Lexington ave., December 12th and 13th.

Inasmuch as the combined attendance on both days conservatively estimated was about fifteen hundred, and the fact that the character of the clinics was high, and also as the Committee this year continued the policy of that of last year in barring all clinicians who had a commercial interest in any part of their exhibition, it is not romancing to say that the meeting was highly successful. Twenty-eight clinicians were actually present.

Dr. A. C. Searl of Owatonna, Minn., filled some compound occlusal cavities in bicuspids, demonstrating the cavity preparation as advocated by Dr. Black, and the method of packing gold as shown by Dr. Wedelstaedt in his paper. [For Dr. Wedelstaedt's paper, see page 985 of this issue of the Cosmos.]

Dr. M. L. Rhein of New York, operated on a young girl in whose mouth he had a week previously contoured with gold the disto-approximal and occlusal surfaces of the lower right first bicuspid. At the same time he had filled, with gold, the gingival third of the mesio-approximal surface of the lower right second bicuspid. The remainder of the approximal and occlusal surface was covered with gutta-percha until the day of the clinic; it was then removed and the gingival third polished at this time. This was done (without the rubber dam being adjusted) by means of emery strips and disks smeared with vaselin. The rubber dam was then applied, the tooth carefully washed off with chloroform, and thoroughly dried. By means of a new rose bur, a superficial layer of gold was removed, and the remainder of this compound cavity was contoured with No. 30 rolled gold, packed with the electro-magnetic mallet. The demonstration of the perfect cohesion of the new pieces of rolled gold to the freshened portion of the old filling was convincing to those who saw the operation. A No. 2 Gillett giant separator was then introduced between the two bicuspids and separation rapidly obtained, which made it easy to polish the approximal surface of the filling, and leave a proper contact point after the separator had been withdrawn.

On the following day, December 13th, Dr. Rhein gave a table clinic, demonstrating the packing of cohesive gold by means of the electro-magnetic mallet. He first covered the exposed dentin with the thinnest possible layer of Harvard cement. On this surface he placed a small piece of moss fiber gold which had been slightly annealed on an electric annealer. This gold was gently patted into position by means of smooth ball burnishers. With these instruments the gold was made firmly adherent to the entire inner surface of the dentin. On this surface strips of rolled gold, commencing with No. 30 and following with No. 60 which had been annealed on an electric annealer, were malleted with the electro-magnetic mallet.

Besides this, a demonstration was given of the possibility of adding freshly annealed rolled gold No. 60 to an old gold filling of two years' standing, after the surface had been freshened by means of a clean bur.

A demonstration was also given of the ability to pack the cohesive gold strips directly over the smooth enamel surface, and leave a water-tight joint.

Inasmuch as it is expected that it will be possible to observe the operations of both Drs. Searl and Rhein for some years, it is hoped that it will be possible to learn the advantages of both methods.

Dr. C. C. Bachman, Waterloo, N. Y., demonstrated the replacing of broken facings on bridges.

Dr. Lawrence W. Baker, Boston, Mass., explained some models illustrating a series of cases treated with special attention to intermaxillary elastics.

Dr. G. V. Black's place on the program was taken by Dr. E. K. Wedelstaedt, who exhibited the manudynamometer which Dr. Black brought. (Unfortunately, on account of Dr. Black's illness, he was unable to do this himself.) The instrument is for the purpose of demonstrating the amount of finger pressure used in handling instruments, and proved conclusively that many operators have less power in their fingers

than they imagine. Dr. Wedelstaedt also exhibited some models of fillings of unknown operators, which had failed.

Dr. C. Frank Bliven, Worcester, Mass., gave a clinic entitled "The Advantages of Gold or Amalgan Veneers over Gold Crowns." Cement fillings are used for weak or badly decayed teeth. These fillings are then veneered with gold or amalgam to insure permanence. The strong adhesion of the cement to the teeth is taken advantage of to strengthen the frail walls and securely attach the metal, which is applied when the cement is in its stickiest condition. A full contour is made that will resist the force of mastication and restore the teeth to usefulness without inflicting injury to the tissues, which may cause loss of the foundation.

Dr. W. A. Capon, Philadelphia, Pa., showed a new porcelain crown, and gave a general porcelain clinic.

Dr. Harold DeW. Cross, Boston, Mass., showed: (1) Models of various appliances adapted to the treatment of fractured maxillæ, including several forms of vulcanite and metal splints, bands, tubes and wires, ligatures and bandages. Models of twenty-three cases of fractured maxillæ, with history showing the condition before and after treatment, including cases with simple comminuted, single, double, and triple compound fractures; fractures of the neck of the condyle; and refractured maxillæ. (2) Normal articulation. Two entire upper and lower sets of artificial teeth, adapted to fit models set in an anatomical articulator. A—One an ordinary plain line arrangement showing defects in same, when placed in an anatomical articulator. B—The second a normal arrangement, a copy of the natural teeth showing deep fissures and cusps, a compensating curve, inclined molars, a long overbite, all of the cusps active on the masticating side, and a balance on the opposite side. C and D—Two casts of natural teeth, set in anatomical articulators, in comparison with the original teeth, showing the angle of the condyle path. E—Models set in an anatomical articulator showing the "normal" arrangement for partial cases.

Dr. W. B. Dills, Brooklyn, N. Y., showed some all-porcelain crown and bridge work, and some special blocks for difficult cases, using the prosthetic porcelain.

Dr. Samuel Doskow, Philadelphia, Pa., demonstrated the use of the Crenshaw matrix.

Dr. Francis A. Faught, Philadelphia, Pa., gave a table clinic showing Dr. M. H. Cryer's collection of anatomical specimens of the face, including a number of impacted teeth; also, an exhibit of stereoscopic radiographs of the face and head.

Dr. Henry Clay Ferris, Brooklyn, N. Y., showed a new set of scalers.

Dr. Albert N. Gaylord, Philadelphia, Pa., exhibited a patient with various removable bridges, mostly porcelain.

Dr. Clarence J. Grieves, Baltimore, Md., showed easy removal and quick repair of Richmond crowns; also some new methods in crown work.

Dr. A. DeWitt Gritman, Philadelphia, Pa., demonstrated the use of the Gritman articulator in the proper articulation of artificial teeth.

Dr. A. W. Harlan, New York, N. Y., operated upon a case of pyorrhea alveolaris affecting the lower incisors and canines. The mouth was sterilized with a solution composed of—

Resorcin and boro-glycerin, āā	ʒss;
Acid. nitric.,	♏ ij;
Aquæ dest.,	ʒiij.

M.

This is to be used freely on a pledget of borated cotton, to be swabbed over the whole mouth. The deposits were removed, and pockets syringed with one-half of one per cent. dried sodium bicarbonate in sterilized water. The pockets were cauterized with twenty per cent. trichloracetic acid, the excess being neutralized with a soda solution. A beta-naphthol solution was recommended to be used daily several times.

Dr. Joseph Head, Philadelphia, Pa. This clinic consisted simply in showing the ease with which a platinum matrix could be made in a deep, compound cavity of a bicuspid, and the rapidity and accuracy with which it could be filled with baked porcelain.

Dr. E. A. Bryant, Washington, D. C., gave a clinic showing his method of making repairs of facings broken from crowns or bridges, without removal of the work from the mouth. The pins of the old tooth or facing are cut off and smoothed down flush with the backing, a new facing selected, and the position of the pins noted on the backing either by waxing the backing and pushing pin into it and marking with a sharp-pointed instrument, or inking the points of the pins. Then drill two holes for the pins, a trifle larger than the pins, and with a fissure bur drill straight across from hole to hole, making a slot. This should be as smooth and straight as possible. Now fit the facing to its proper place. Make some notches on the inside of the pins of the tooth selected, either with a bur or a rat-tail file. Touch the pins with the regular tinners' soldering flux (muriatic acid and zinc), and with a small dentists' soldering iron run some tinners' solder between the pins so as to fill the space. This will generally take the form of a ball. As soon as the solder flows, dip the tooth into cold water. If this is not done, the tooth will crack from the expansion of the pins. With a rubber file or any flat rough file, file the solder away outside the pins, so as to make the lug fit into the slot as perfectly as possible. Flow cement over the lug and back of facing, and fill the slot and over the backing with the same. Push the tooth to place, let the cement set, then smooth off the pins and lug from the back of the crown or bridge where they have extended through the backing. This repair will be as strong as the original facing, can be made in a few minutes, and at a very small cost.

Dr. Bryant also showed his box system of crown and bridge work. Preparation is as for repairs. A box is made and soldered to the backing to fit over the lug instead of cutting a slot. Thus the finished work has the slots in place to receive the facings, and no facings are soldered, but all cemented in place. By this system any facing or tooth, rubber or plate, can be used, and much or little or no gold may be shown, and in case of breakage it is easily repaired.

Also his method of making removable bridges and clasp partial plates, the main feature being combinations of gold and porcelain by mechanical means.

Dr. V. H. Jackson, New York city, exhibited a very large number of models, demonstrating very fully his system of regulating.

Dr. Geo. H. Leggett, New York city, demonstrated the use of rubber teeth as removable facings in bridge work. A rubber tooth is taken, the shoulder below the pins ground off, and a backing of gold adapted to it; the holes in it being large enough to easily clear the pins. Another piece, which may be of pure gold, is taken, and a depression made in it with a ball burnisher, large enough to cover the pins. This is trimmed and adapted to the backing already on the tooth. Remove, fasten with a touch of solder, replace on tooth, and wax up on model. Remove facing, invest, and solder as usual. Facings are put on with oxyphosphate or gutta-percha.

Dr. Robert T. Moffatt, Boston, Mass., showed the preparation of models for carving teeth and crowns of porcelain; the manipulation of the body, the results of the "biscuit" bake method of enameling, and the finished result. He did not bake the teeth, but explained how it was done, using the electric furnace. This, of course, is perfectly simple, as all that is necessary is to turn on the current, and then at the proper time to turn it off. He also showed many specimens of finished work for actual use, including cases that have been worn in the mouth.

Dr. R. Ottolengui, New York city, gave a table talk on diagnosis in orthodontia. He showed models more espe-

cially of prognathous upper jaws, pointed out the inadvisability of extraction, and indicated treatment by rearranging teeth of the upper jaw, then either jumping the bite or by means of intermaxillary forces jumping the occlusion. He also discussed several cases presented by visiting dentists for diagnosis.

Dr. Fred A. Peeso, Philadelphia, Pa., showed some remarkable bridge work and the technique of abutments.

Dr. H. C. Register, Philadelphia, Pa., gave a demonstration of the use of the copper ligature matrix, adapted to all kinds of fillings.

Dr. M. I. Schamberg, Philadelphia, Pa., demonstrated the efficacy of the Angle method of treating fractures of the jaws, exhibiting a patient who was treated for a double compound comminuted fracture of the lower jaw, by the aforementioned method. A number of members examined patient and failed to find where the bone had reunited.

Dr. Rolof B. Stanley, New York city, showed numerous models of cases of malocclusion before and after treatment and in progress.

Dr. Sinclair Tousey, New York city, demonstrated the use of his fluoroscope for application inside of the mouth for the direct X-ray examination of the maxillæ and the roots of the teeth. This is made like a mouth-mirror, but instead of a silvered surface, it has a coating of barium platino-cyanid, which is the same fluorescent material that is used in the regular fluoroscope for the X-ray examination of the limbs and various parts of the body. In his dental fluoroscope, however, the image is produced on the reflecting surface instead of having to look through it. The teeth and the maxillary bones can be seen as if the tissues were of glass, and the field of observation extends about an inch beyond the apex of the roots. The second portion was a demonstration of a rapid method of radiography. Slips of bromid paper are wrapped in black paper and rubber dam, and are held against the lingual surface while the light from an X-ray tube shines through the thickness of the cheek and jaw, and produces a permanent image on the paper. The picture is developed in an ordinary lighted room without going into a dark room. The finished X-ray picture is ready in five minutes. No film is used, the picture being made direct from the patient. Pictures of a little girl with unerupted teeth were made in this way; also a picture of one of the dentists present in whose upper lateral a Gates-Glidden drill had been broken off four years ago. The picture showed the deepest part of the root-canal. Other pictures were made of root-fillings, crowns, etc. About thirty radiographs were exhibited, among them one showing a gold probe passing up through the root-canal and emerging in the nostril. Also pictures of impacted and unerupted teeth and of other abnormalities. Dr. Tousey demonstrated his special treatment tube for the application of the X ray as a curative agent in cases of pyorrhea, and showed radiographs of two cases cured by it. Also his special handle and vacuum electrodes for the application of the ultra-violet ray and high-frequency currents in cases of pyorrhea.

Dr. D. N. Booth, New York city, demonstrated a method of making detachable porcelains in crown and bridge work, using ordinary plate teeth, and attaching to them a gib, similar to the Van Woert and Mason methods.

S. L. Goldsmith,
Chairman.

MARYLAND STATE DENTAL ASSOCIATION.

Quarterly Clinic, December 1904.

THE regular quarterly clinic of the Maryland State Dental Association was held in the Royal Arcanum building, Baltimore, on Saturday, December 3, 1904.

The afternoon was devoted to the following clinics, which were discussed at the evening session:

CLINICS.

Dr. H. C. REGISTER, Philadelphia, Pa., presented the result of his work with the "Copper Ligature and Ribbon Matrix," as follows:

The first matrix to my knowledge was introduced by Dr. Louis Jack of Philadelphia, his forms being rigid and made of steel in negative forms to give a proper tooth contour. I have used Dr. Jack's matrices for many years. Since the introduction of his matrix a great number of forms and makes have been offered to the profession through the depots.

The method covers so much ground that only some of its many phases could be presented at a single clinic. Its make-up consists of planished copper, No. 36 to No. 40-odd gage, and silk ligatures. In its general application, a copper ligature for neck constriction, and phosphate of zinc are called into use now and then. The matrix is a little thing in itself, but great in what it enables the operator to accomplish—a "multum in parvo."

For general use the matrix may be summed up in three definite forms or classes:

First, the ribbon used upon the immediate front teeth. A copper strip or ribbon cut a little wider than the open cavity between the neck and incising edge is woven in and out between the teeth and caught at one end and held at the other—thus converting a complicated cavity into a simple one. This class of cavity should be filled in the greater part with gold cylinders packed against the dentin with strips of bibulous paper, and over the enamel contact finished with cohesive foil.

Second, or partial band form—used upon the bicuspid and molars in connection with silk ligatures for fixation. These bands can be used upon one or two approximal surfaces at the same time, the one ligature securing both matrices. In cavities extending below the gingival margin the matrix should be cut with a tongue-shaped prolongation extending to the bottom of the cavity. In fixation, carry the ligature down on to the neck and root portion as deep as possible, followed by burnishing the tongue portion into position. Into the approximal spaces two pellets of zinc phosphate, mixed to a stiff putty and placed on each side of the pocket, are forced with the fingers into the bottom of the space, or instrumented into position and allowed to crystallize. If no great pressure be used, bibulous paper may be packed into the space. Looking into the cavity, if the bottom of the same be not perfectly closed, it should be filled in the negative form with zinc phosphate and allowed to crystallize. These cases are prepared for alloy, or alloy and gold in combination, alloy always being used in the bottom portion.

The third form of matrix is a ring or ferrule used for reproducing the crown. In this form a band or ring is made of copper to perfectly fit the tooth at the neck just as though a band for a gold crown was being made, except that copper is used, and giving it sufficient flange to meet the perfect restoration of the crown, or an exaggeration to protect the space. The band is soldered together with soft

solder. If there are any inequalities of the band at the neck, it can be clipped in as many places as necessary, burnished to position, and the cuts soft-soldered and the inequality cut smooth, or the V-cuts burnished to a snug fit and adapted with zinc phosphate and silk ligatures holding it firmly in position. This matrix should allow perfect occlusion, and be allowed to remain on for several hours. All others are removed upon the completion of the filling.

In normal spaces matrices can never be drawn from the teeth toward the occlusal contact without preparing the space by wedging. This form precludes that painful process, as the matrix requires no wedging. The normal space receives it, and it is removed by breaking at the point of contact or knuckling point, and with a circular motion drawn out sideways. This method permits the interproximal spaces to receive the same attention as the tooth, they being perfectly restored, giving a possible gingival festoon restoration that is not possessed by the other forms of matrices.

There are several points about the use of the copper ligature matrix that make it unique. It can be perfectly adapted to the necks of all teeth with the least amount of trouble in its adaptation both to the patient and the operator. It permits of the most perfect manipulation, and being flexible allows just sufficient space for exaggeration or perfect knuckling of the filling. It can be opened upon its lateral aspect, thus exposing the different surfaces for inspection before removal. It requires no separating of the teeth. It permits of any form of contour to be produced or exaggerated to prevent the impaction of food. As a rule it is only necessary to include the one tooth operated upon in the dam. It permits of restoration of the gingival and interproximal spaces.

The procedure consists of a strip of copper, No. 36 to No. 40-odd gage, cut straight, oval, or curved to meet the desired shape or contour to be reproduced, the object being to give a negative that will permit the restoration of the tooth and at the same time restore the spaces. This form of matrix also permits the most perfect inspection of the cavity walls before operating.

In reference to filling material, more care should be given its preparation than the profession at the present seems to think necessary. So much depends upon its proper preparation that a careful inspection must be made before use. This applies particularly to alloys, the physical composition of which I have found to be greatly enhanced or improved by a series of alcohol washings or dilute sulfuric acid followed by alcohol, which permits the mercury and alloy to be united so as to give a perfect fracture in its preparatory make-up. Three or four washings of alcohol have given me the best results. Thus prepared, the after result is a hard steel-like body of great edge strength. My preference is Fellowship alloy, of the quick-setting grade. Alloy is most perfectly packed by a rapid rotary motion. After an experience with several varieties in the use of copper alloy, I confine myself to Kirkbride's make, which I import from London. This in my hands has proved to be one of the greatest conservers of teeth with which I have had any experience. Its grain and edge strength is all that could be desired, and the color not objectionable in the molars. Copper amalgam is the only positive chemical amalgam we have. A gold finish can be used in combination with any alloy at the same sitting. The profession, however, is needing something more than material and means in its effort to save teeth — and that is *professionalism*. Higher education goes for nothing without it. Not the artisan, but the doctor. Are we sizing up in the pathological work? Are we curing dental ills and restoring function? This should be the first consideration, for beautiful results avail nothing if the essentials are belittled or lost.

Dr. F. A. Peeso, Philadelphia, Pa. —"Removable Bridge Work, and Removable Abutments Technique." Dr. Peeso's clinic consisted of showing specimens of different styles of removable bridges and

technique of telescope crowns, tubes, and splint pins: A lower extension saddle-bridge, anchored to the two bicuspids with telescope caps; A lower bridge restoring the two bicuspids by telescope cap on molar, and spur resting in countersunk gold filling in lingual side of canine; A lower first molar and second bicuspid restored by gold inlay and tube in molar with splint attachment and spur resting in gold filling in first bicuspid; Upper bridge, restoring two bicuspids and a lateral incisor by telescoping first molar, tube and splint pin in canine and spur in gold filling in central incisor. Dr. Peeso also showed the different steps in making telescope crowns and the mandrel method of making tubes.

Dr. W. W. Dunbracco, Baltimore.—"Demonstrating Meyer's Dental Obtundent for Sensitive Dentin." Dr. Dunbracco's clinic consisted of de-sensitizing a cavity located in the buccal surface of an upper left second molar, close to the gingival border, injecting into the dentinal tubuli a five per cent. solution of cocain by means of the Meyer's dental obtunder, and thereafter preparing the cavity painlessly. The clinician drilled a cavity, employing a No. ½ bur, through the enamel into the dentin deep enough to sink the point of the syringe. This cavity was about one-thirty-second of an inch from the cavity of decay, and was made without pain to the patient. Then by pressure applied for one and one-half minutes, cocain was forced through the tubuli of the dentin, and after two minutes the cavity was prepared painlessly.

Dr. Paul Warrington Evans, Washington, D. C.—"An All-Porcelain Jacket Crown or Porcelain Hood." The object of this clinic was to show the method of making the all-porcelain hood or jacket crown according to the methods used by Drs. Land, Spaulding, and Thompson.

Dr. J. Clarence Grieves, Baltimore.—"The McCullough Protective Backing with Variations." Dr. Grieves' clinic consisted of a description of the McCullough crown, according to Dr. McCullough's method. (See *International Dental Journal* for August 1902.)

Dr. A. C. Brewer, Baltimore.—"Demonstrating Jenkins' New Porcelain in Crown Work." Dr. Brewer's clinic consisted of a demonstration of Jenkins' new porcelain for use in continuous-gum work. He claimed that this was much easier to work in continuous-gum work than the higher-fusing bodies, and that the great difficulty of the change in the color of the teeth was overcome by this method. He used with this body the Ash tooth, and said that the color would remain absolutely the same. He thought that this new porcelain of Jenkins' would prove sufficiently strong for any continuous-gum work, and mentioned the fact that he had made several cases for different patients and they had proved very satisfactory.

Dr. G. Marshall Smith, Baltimore.—"Application of the Crenshaw Matrix." Dr. Smith gave a clinic showing the use of the Crenshaw matrix in gold work. He claimed that by the use of the matrix compound cavities were readily reduced to simple ones, and that the matrix greatly facilitated the filling of these cavities with gold or any alloy.

Adjournment.

Evening Session.

In the evening at 8 o'clock the society reconvened in the banquet hall of the Rennert Hotel. After the banquet had been served, Dr. W. G. Foster, president, called the society to order and announced as the first item on the program a paper by Dr. Edward C. Kirk, Philadelphia, Pa., on "The Stress of Dentition."

Dr. Kirk. *Mr. President and gentlemen,*—I want to say with reference to the topic of the paper which I have the honor to present to you this evening, that the central thought of this paper has already been presented to the Jefferson County Dental Society, at Watertown, New York. At the meeting of that society some weeks ago, I was asked to address the assemblage and I spoke upon this theme. However, this idea has been for the first time reduced to writing for your consideration, and I make this ex-

planation as a matter of record in justice to the Jefferson County Dental Society and to yourselves.

[Dr. Kirk's paper is printed at page 665 of the June issue of the Cosmos.]

Discussion.

Dr. E. P. Keech, Baltimore. We have heard with great pleasure the paper which Dr. Kirk has read to us this evening. It is along a line of thought which I have had for these many days, and it embraces a great deal more in pathology than is embraced in that paper. Dr. Kirk has spoken of parturition among other things as being primarily a physiological process. We are aware of the fact that in the eastern countries of Europe women who are *enciente* and about to bring forth their young, simply retire from their horses or camels, as the case may be, to a corner, and the process of parturition goes on and the journey is resumed as though nothing had transpired, showing of course that in normal conditions parturition is nothing but a normal condition. Dr. Kirk has overlooked in my opinion one serious thing in his paper; that is, he has only inferentially referred to the matter of normality. I think, so far as dentition is concerned, the reason children are subject to these diseases which he has explained in his paper are due to the fact that we have departed from the normal. Our civilization is too high for normality. If we take children, and I have had a notable example of this within the last day or two, who are in no way whatever affected with neurosis, we will find that the process of dentition will be carried on without difficulty. I believe one of the first manifestations of inherited neurosis is an abnormal dentition and dental irritation during the evolution of the deciduous teeth. In other words too much stress cannot be laid upon the conditions of the mouth and the teeth as we dental practitioners see them almost every day.

I am inclined to the opinion that if these matters were transferred to the dental practitioner, where in truth they belong, the children would receive better attention than they do at the present time.

Dr. B. Holly Smith, Baltimore. The latter part of the paper, referring to complications that often arise as the result of dental irritation, appeals to me strongly, because I have seen so many instances in practice, and have in mind so many records of neurosis originating in dental irritation. I think too much cannot be said along that line, not only of dental irritation, but of any irritation in the field of the fifth nerve. Dr. H. B. Thomas in an interesting report cites a number of cases in which children developed chorea on account of adenoids. In one particular case I happened to visit a friend whose family are patients of mine. He told me his little boy, whom I had not seen for several years, had developed nervous twitching about the face, and seemed much distressed. I remarked that I believed it was due to adenoids. He said he did not know what the trouble was; that the boy did not get out of doors much, but stayed in the house a great deal. I asked to see the child and found a cauliflower development stopping his breathing. I referred him to Dr. Thomas for an operation, and in a very little while after the removal of these adenoids the child recovered from the painful symptoms. Now, we might say that the savage, the outdoor person, is free from all trivial interferences with normal dentition, but we know these crises—the crisis of dentition, the crisis of menstruation, the crisis of childbearing—in our indoor life frequently are accompanied with distressing symptoms which need the intelligent care of the trained professional man. I believe that as the German philosopher called for more light, we should call for more air, and that if our children had pure air and a simpler life there would be no occasion for much of the distress which they exhibit. However, the average length of life has increased by just such ministrations as have grown out of this very paper, and it is the best solution of the question we have yet been able to make.

Dr. Wm. A. Mills, Baltimore. Dr.

Kirk speaks of the stress of dentition, but it occurs to me that it is usually distress. Dentition is a physiological process; parturition is a physiological process; but sometimes in these cases, as Dr. Smith has said, nature in weaving her cloth has dropped out some thread and something is going to happen. The unexpected happens, and we have a pathological condition. I remember a case of a child of about eight or nine years of age who had been suffering with convulsions, brought to me for examination. I found nothing the matter with the child's mouth or teeth at the time except a slight swelling just above the upper first premolar. This was relieved by lancing. The child returned again in a few days having had no recurrence of the convulsions. This child had been treated for some time by a physician who had failed to relieve the condition. On the second visit to the office, I found just above the premolar a little enlargement of the tissues, which I diagnosed as a small circumscribed abscess, cause unknown. When I opened the abscess I found in it a small disk which was very hard. Unfortunately I threw the disk away. I could not tell whether the disk was a piece of bone, cementum, dentin, or all conglomerated. When the disk was removed the abscess cavity was evacuated and treated antiseptically, and the patient dismissed. From that day to this the child has been free from convulsions. I have since come to the conclusion that whatever was the cause of the spasms, they ceased after the removal of the disk. Now, causes of systemic disturbances, via the oral cavity, often come before us who have extended practices, therefore, we should always have before us the motto of the Cosmos: "Observe, compare, reflect, record." That has been my watchword ever since I have been in the profession. How many little things do we meet in our practice which seem of no special importance, that will be of service and do us good in years to come! By this we are often enabled to save our patients from heroic operations caused by the stress of dentition, the interruption of the normal processes of dentition, and other well-known dental pathological conditions amenable to simple treatment.

If we are to become professional scientific men we must advance along scientific lines. If we confine ourselves to the technique of the fingers alone, we will be nothing but expert mechanics. Be professional and, at the same time, be honorable men.

Dr. Grieves. The paper brings to my mind some work Dr. Cryer very ably presented before the New York State Dental Society, throwing much light upon the subject for us as practical dentists. Dr. Cryer states that as the mandible and maxilla develop, the cancellated tissue forming the alveolus, together with the teeth therein contained, passes downward and forward over the older cortical bone layers forming the body of the jaw. He particularly emphasizes the danger of adhesions of these layers from inflammatory conditions brought about by traumatism, injudicious regulating, etc., thus preventing development, and it struck me that not only these local causes but errors of nutrition and the grave neuroses such as paralysis, chorea, etc., might very readily affect the permanent dentition, interfering with this loosely calcified material as it passes over the mandible to form the lower alveolar process, or upper as the case may be, and in that way produce innumerable irregularities and malformations.

We are recalling cases, and I recall one case of infantile paralysis where there was a distinct depression along the left premolar region, and unquestionably the infantile disease was produced from the "stress of dentition," producing in its turn distress of permanent dentition as has been said. There is no doubt that infant feeding has much to do with the matter. The question as to just what food will best suit the child, and the experiments to find such, unless the child is raised entirely at the breast, is a very troublesome one. I heartily thank Dr. Kirk for the paper and for being with us.

Dr. H. F. R. Snyder, Baltimore. While listening to the discussion, I was pondering over one or two slight experi-

ences in my daily routine. Only a few weeks ago I met with a case where a child had a temperature of 103° or 104°, producing several spasms, which gave way immediately upon the lancing of an erupting temporary molar. It was simply a reflex condition. Not only in the cases of the eruption of the temporary teeth but of the permanent we find these rather abnormal reflex conditions occurring, and I think if we are to be practitioners, we should be practitioners in the full sense of the word.

Dr. Wms. Donnally, Washington, D. C. This is a subject that has been very interesting to me for several years, having given special attention to it for some time. I would like to ask Dr. Kirk in closing the discussion to call our attention more closely to the second dentition. He dwelt particularly on the first dentition, and I think the profession has been drifting for years toward paying too little attention to the second dentition. I would like the essayist to emphasize and direct our attention more especially to that, because I have more recently had experiences with abnormal conditions resulting from second dentition. Some of these cases I would like to call attention to but for the lateness of the hour.

Dr. Kirk (closing the discussion). In order to clarify what I have already said in the paper, and which Dr. Keech evidently did not understand, I want to say something in regard to normality. Dr. Keech said that I referred only inferentially to normality, and thought I should have said more about it because it is a question of pathology and not physiology. Now, briefly stated, I like to regard the question of normality from the standpoint of the definition of vitality or life given by Mr. Spencer. We have what may be called the physical phase of life and the metaphysical phase of life. The metaphysical is constantly putting before us the question of what is life. But no man has answered it better than Herbert Spencer in his definition dealing with life from the physical basis exclusively, and for this discussion Mr. Spencer's definition, in which he states that "life is the continual adaptation of internal relations to external relations," answers the purpose. There is theoretically at least such a thing as a normal standard of vitality, and in the light of Mr. Spencer's definition we have an entirely normal condition where the internal processes are in perfectly harmonious balance with the external. So the sum total of this normal physiological process going on in the body is such as to enable it to overcome the stress of the conditions which environ the progress of life. Hence my illustration of the bicycle. The bicycle stands upright just as long as the rider puts in sufficient potential to overcome the attraction of gravity. He may put in a surplus potential, and may have more energy than is necessary to move on in a straight direction. But if he has no surplus, and only sufficient to propel the machine on a level surface, when he comes to an elevation the machine falls because he has not enough potential to carry the bicycle over the hill. I think we may apply that idea of the internal forces balancing the external forces to much of this question as to what I have called the stress of dentition. It is a well-known fact, particularly to Dr. Smith and some others who have experimented in this line, that when a plant, for example the rose, grows and goes through its cycle of development up to the point of reproduction of its kind, that is, the blooming period and the production of the seed calyx immediately following the blooming period, it then shows symptoms of vital exhaustion; its vitality is lowered. It is a well-known fact that if this seed calyx is allowed to remain the plant will be more exhausted than it would be if the seed calyx be taken off. Therefore we would infer from this that the effort to produce the seed calyx represents a certain amount of physical work to be done. And so, applying the idea to dentition, it seems to me very evident that the effort upon the part of the infant economy to produce what we call the evolution of the denture, the manufacture of a lot of teeth and place them in order, represents a definite amount of physical work, and

in the normal infant in which the adaptation of the internal relations to the external relations is normal, that infant passes through the period of dentitional stress without damage to the infant economy. But in the case of the weak infant, as in the case of the bicycle, where there is only potential sufficient to run on a level surface, when it comes to the additional amount of work required to be done, it is not competent to meet this additional demand and it falls down in some way. And that falling down may be expressed as what we call pathological dentition; that is to say, inharmony or lack of correspondence between these two processes—resorption of the crown and the development of the root end—whereby the root is forced back on the papilla, and we have a traumatic inflammation causing certain reflex nervous phenomena—among others, general nervous exhaustion, one of the familiar expressions of which is production of convulsions. The whole system of nerves is affected, and results in these explosive outbreaks symptomatic of nervous exhaustion. I am glad to hear of the cases of Dr. Smith, which seem to corroborate the evidence of the paper that it is significant that these forms of infantile chorea are coincident in time with the period of dentitional evolution, *i.e.* covering the period of from four to ten years of age. It is significant that these peculiar nervous phenomena develop just at that time. There are on record cases of children where these distinctly choreic outbreaks result from various sources of nervous irritation. I call attention to this with the hope that it may suggest to the general practitioner or the specialist the possibility of this occurring, and that we may be able to answer the question, Is there any possible source of peripheral dental irritation in these cases which may be producing these nervous outbreaks? We must be prepared to answer this question.

Much is said about the recognition of the dentist by the physician. Let us think of that for a moment. We have patted ourselves on the back and said, What great boys are we, when we know all these things and the medical men do not! Why should medical men know of these things, when we have assumed the right to know about them? We are specialists engaged in the study of conditions affecting the human mouth. Is that true? Very well, it is our business to know all that the human mouth teaches, and because we have assumed to know these things medical men have not bothered themselves about them. The medical man says it is the province of the dentist, and if he does not recognize them—then we dentists claim to know things that we do not. Therefore I say we must know them.

The question of the scientific in relation to the practical has come up. I don't know the meaning of the word in that particular relation. What do we mean by practical? G. V. Black said, and he was inspired when he said it, "The most practical man in the world is the man who knows most about his business." If we analyze the terms we will find that in the last analysis scientific and practical are interchangeable terms.

There seems to be a little difficulty about the stress of dentition and distress of dentition. The relation of stress to the distress of dentition only stands in the relation of cause and effect. The stress of dentition is expressed in the shape of pressure of physical work on the system, and when the organism fails to respond to perform that work the stress produces distress.

Dr. Donnally referred to the stress of second dentition, and asked me to direct your attention especially to the second dentition. I dealt with that subject in my paper. I hold that these phenomena resulting from the stress of dentition may make their appearance in the evolution of any teeth. I have seen difficulties follow the eruption of the third molar. In cases where the eruption of the third molar occurred at the age of forty-five, I have seen frequently manifestations of nervous irritation of a character that I have described in my paper and have seen these disappear with the eruption of the third molar, and so it is quite true that

these phenomena may make their appearance in the evolution of any teeth, or through the whole dentitional period. They are not related exclusively to the first dentitional period.

Dr. Kirk's paper was passed and the next order of business was the discussion of clinics held in the afternoon.

Discussion of Dr. Register's Clinic.

Dr. H. E. Kelsey, Baltimore. I saw the clinic of Dr. Register, and was very much impressed by the excellent manner in which the matrix accomplished the object for which it was intended. My own experience in this line of work is confined more to the plain steel matrix than to the copper one. I can readily see that the copper matrix has some advantages over the steel, especially with the use of the ligatures, and I am going to give it a trial and feel that it will prove useful to me. Some points of the process are not clear to me, and I am going to ask Dr. Register if there is anything in the metal itself; if any other metal is as ductile as the copper, whether it is just as good, and whether the copper has any influence on the material used to make it better than the steel matrix, provided the steel is as ductile as the copper.

Dr. Kirk. I have used the copper matrix a great deal for the class of work Dr. Register recommends it for, and it seems to me that it is one of those very useful practical things which it is remarkable that the dental profession has not generally adopted. My attention was first called to this method by Dr. Clapp of Boston, who used German silver. I had used this method for some time, when one day, being out of German silver, I used the copper and found that in using thin copper I got better results than with the German silver. In comparison with steel and German silver, the copper is much more satisfactory and adaptable to the work in hand.

I was interrupted in hearing Dr. Register's report of his clinic, and I may be repeating something he said, but I want to emphasize with as much force as possible one point, and that is the ductile feature of the copper, which when adapted to the tooth as a matrix enables you with suitable instruments to bring out the contour of the filling as you desire. It is just that quality which makes it more desirable than steel and almost any metal of which I have any knowledge. Held with the ligature on the tooth, you can burnish it to any form you desire the contour to take. The adaptation of the copper to the form of the tooth is so easy and done so readily with the ligature that it seems to me it should be generally adopted. I don't know of any little device in dentistry of more practical service in making contour operations than this matrix. It may seem a little surprising to some, but you can use the copper matrix for the impaction of gold. The copper matrix will be rigid enough to pack contour gold fillings against it. There is some yielding, but the little yielding that occurs is sufficient to enable you to knuckle the filling close to the adjoining tooth.

Dr. Register (closing the discussion). In bringing this clinic before you today I had no idea of introducing anything new or recent. I have given it upon a number of occasions simply because it has been a successful method in my hands. I have been keeping records of my work done with this method for over twenty-five years. I have a very simple card system for these records. On one side of the card is the location and character of the filling and any remarks I want to make on the patient. On the opposite side is kept a chart of the matrix. I have been recently looking up work of this character performed years ago, both of all-alloy fillings and alloy in combination with gold, that are as perfect today to all intents and purposes and uses as when put in, twenty-five years ago. In all these cases the alloy or the gold and alloy was inserted at the same sitting. This is no rash assertion I am making, but the positive records, and it is this work and the perfectness of the work that has impressed me so strongly with what can be done with this method, that I have on several occasions brought it before the profession to show what the

profession is losing by not using it. If you will take up and study this method in all of its applications it will enable you to do as beautiful manipulative work as any method, and it gives you a filling that protects the tooth and prevents the re-attack of bacteria along the border line of the filling.

Another point: I use the rotary motion in packing the alloy. I think this is one of the greatest assistants we have in alloy work. The alloy prepared in the regular way and packed with the rotary motion forces the mercury to the surface where it is easily removed, and these fillings made in that way crystallize under positive conditions, and the crystallization that is brought about is as perfect a mechanical union as can be obtained between the mercury and alloy.

In regard to the use of copper for this work, I have used every kind of metal that I thought would be adapted to use as a matrix, and copper presents itself to me as the ideal metal. It permits the operator after having placed it in position and constricted it at the neck, to reproduce perfectly the negative form of any tooth in the mouth, no matter the position. It enables one to secure the proper contour to prevent the impaction of food between the teeth, thus making the surroundings more healthy.

Discussion of Dr. Evans' Clinic.

Dr. E. E. Cruzen, Baltimore. I only saw specimens and models of the work done by Dr. Evans. I would like to have seen the crown made. However, the specimen shown I hardly think is a fair test of that kind of crown, as it was for a lower central, and it would hardly permit of sufficient porcelain to make it practical. It was a most beautiful piece of work, and I was pleased with it because of the advantage of not showing any metal in the mouth. Anything in porcelain appeals to me, but I rather feel that the porcelain jacket with the porcelain facing makes a much stronger crown, and I see little or no advantage in making a crown of that character without the platinum jacket. These things are sometimes beautiful in appearance, but will not give service. I would like to know Dr. Evans' experience in the service of this kind of crown.

Dr. Evans (closing the discussion). I cannot answer the question with regard to the service of these crowns, as I have not had sufficient experience with them as yet to judge. I am well aware of the fact that these crowns are not as strong as those made with the platinum jacket, but in many cases I think there is sufficient strength for all practical purposes. I think when hoods are put on roots, if the preparation is correct you will find that the strength is almost equal to that of the jacket crown. The strength of these crowns depends a great deal in the adaptation of the hood to the root, and that was brought out in making the matrix. A great deal also depends on the perfect baking of the porcelain.

Discussion of Dr. Brewer's Clinic.

Dr. Cruzen. I saw the pretty specimens shown by Dr. Brewer. He showed the method of making a block for any number of teeth which I think in many cases gives us more satisfactory results than when working with blocks from the supply houses. I have many times used single teeth and by building upon them a gum extension have obtained results impossible to bring about in any other way. In restoring a case where there has been recession of the gums it is sometimes impossible to obtain teeth from the supply houses that will show the recession of the gum as it originally was.

Dr. Keech. One thought has occurred to me during the reading and the discussion of the paper, and which was so clearly brought out in Dr. Register's report of his clinic—that is the difference between the artist and the professional man on one side and the artisan on the other. Persons in whatever vocation in life, whatever goal they strive for, if they do not reach it are sure to make progress toward it. I am just coming to the end of a professional career and most of you are just beginning yours, and I want to say that it has been a great pleasure to

me to strive to be an artist and professional man rather than an artisan.

Discussion of Dr. Dunbracco's Clinic.

Dr. Holly Smith. It seems to me that this question of pressure anesthesia opens up quite a broad field as to the possibilities of medication through pressure. It suggests the question whether or not, in drilling a cavity in a remote portion of a tooth and forcing a medicament into the tubuli of the tooth, it is possible to deprive of sensation whole sections of that tooth. I have not given the subject special attention, but it occurs to me that such a thing is possible.

Dr. Register. I have had some success in the employment of this method, and I want to say in reply to Dr. Smith that with these syringes only a very small portion of the medicament is forced into the tooth, but the whole tooth is as readily anesthetized as any portion of it, or the portion you wish to fill. It takes a great deal of trouble to bring about this anesthesia. You have to be very careful to get a good adaptation of the needle to the cavity, and the force has to be applied very gradually in order that the dentin will take up the medicament. If you can succeed in doing this the result will undoubtedly be good. I have been successful with this method in only a limited number of cases.

Dr. Kirk. We have been doing a little of this at the University of Pennsylvania clinic, and the results have been beautiful. With regard to the deleterious effects, I think we have an analogous condition in the cataphoric induction of cocain into the tooth-pulp, and I cannot conceive of any danger to the pulp from the minute amount of cocain injected. I think that this method does not endanger the life of the pulp. I would like to hear from Dr. Register or Dr. Dunbracco whether they have anesthetized the whole pulp by the injection of the cocain into the dental tubuli.

Dr. Holly Smith. I would like to ask Dr. Kirk if he thinks the forcing of this medicament into the tubuli does not in some sense affect the contents of the tubuli.

Dr. Kirk. I do not believe it would make any difference should it do so.

Dr. Holly Smith. I think the effect of the force would be to destroy the contents of the tubuli.

Dr. Kirk. Of course it is possible, but it does not impress me that way. I think the force would not be any more detrimental than the effect of electrical force used in carrying a similar amount of cocain into the tooth.

Dr. Register. One thing in regard to the application of cocain in the operation of destroying pulps through pressure using cocain: Where that is done it can be done successfully and painlessly if the pulp be removed within a few minutes after the application. I have noticed that in some cases where the pulp is not all removed immediately, it will become as sensitive as before the application.

Dr. Dunbracco (closing the discussion). I have had this instrument since July. I saw it under such favorable circumstances that I determined to secure one and give it a thorough trial. I had a good deal of trouble with it in the beginning, that is in adapting the needle to the cavity made for forcing the medicament into the dentin. I use a No. ½ bur to make a small cavity which will accurately fit the point of the needle, and with care it is possible to force every particle of the medicament into the tooth, and obtain a perfect anesthesia. The medicament used is a secret preparation of cocain, but I am informed that with the amount of the drug in the syringe which the directions call for forced into the dentin, only one-fiftieth of a grain of cocain is forced into the tooth. I have used the instrument in many cases, and I have been delighted with the results obtained. Of course as to the effect on the contents of the tubuli I do not know, but I consider Dr. Kirk an authority on a question of that kind.

There being no other business before the society, Dr. Foster declared the meeting adjourned until the next quarterly meeting.

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Devoted to the Interests of the Profession.

EDITED BY

EDWARD C. KIRK, D.D.S., Sc.D.

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PHILADELPHIA, AUGUST 1905.

EDITORIAL DEPARTMENT.

THE ENCOURAGEMENT OF SCIENTIFIC RESEARCH.

AT the last annual meeting of the Dental Society of the State of New York its president, Dr. William Jarvie of Brooklyn, in his annual address presented to the society a sum of one thousand dollars as a foundation the income of which was to be used for the coining of a gold medal to be presented to the author of the most valuable scientific work during the preceding year in connection with dentistry. On a previous occasion this same society within a few minutes' time raised a fund of over one thousand dollars for the promotion of scientific research. In this issue we publish a notice of similar action by the New York Institute of Stomatology, whereby a prize of $250 and a gold medal is offered for the best scientific article involving original research.

These, we take it, are encouraging and practical indications of the higher estimate which representative dental organizations are placing upon scientific research, and more especially it is an indication of the desire for fuller knowledge, more light upon the fundamental data of our profession. No circumstance can be more indicative of a healthy professional growth than this willingness of those who are able to give financial support and encouragement to the class of investigation which will yield a harvest of practical helpfulness

to the general practitioner and be of benefit to his *clientèle,* the public whom he serves.

The spirit which animates these efforts to stimulate scientific investigation in our profession is both admirable and commendable. Its several manifestations are examples of true altruism, for beyond the commendation of their colleagues no reward other than the gratifying sense of having done a noble act can come to those who have given of their means for the betterment of their calling; and if these acts should have no other effect they at least brighten the professional pathway and afford encouragement by the stimulus which is inseparable from an example of noble generosity.

These individual expressions of interest in the scientific advancement of dentistry are to be considered, we think, in a broader relation than is afforded by the purely personal side. The act which creates such a foundation as the "William Jarvie research fund" is to be regarded as a practical expression of the professional sentiment of the time—a reflection of what many others would do were they so situated as to be able to give practical realization to their desires. It is this aspect of the question which affords most ground for encouragement as to the character of the professional sentiment at present and hopefulness as to its future trend. In the comparatively short span of its professional life dentistry has been compelled to cover much preliminary ground before it could take rank as a professional calling. Its professional organization, its associations, its colleges, its literature, and its jurisprudence had to be developed and adapted to its needs; but above all its scientific foundations were yet to be laid, before its claim to professional rank could be fairly conceded. Twenty-five years would easily compass all of any importance that has been done in a scientific way for dentistry by dentists. But that which has been done has wrought out a quiet revolution in professional thought. We hear little or nothing in these days of scoffing and derision at the impracticality of scientific work in dentistry; if it occurs at all it is uttered in whispers by the "back number" member to his sympathetic but ignorant contemporary. The dental profession has come to understand, to respect, and to justly value the results of scientific research and the methods by which they are attained. Therefore we feel that the establishment of these foundations for the special encouragement of dental scientific research is a reflex of the professional spirit of the times.

But, granting that we have reached the stage of professional development where the endowment of research in our calling is possible and to some degree an accomplished fact, there is yet to be considered the serious question of how such endowment may be best utilized. The spirit of scientific research is something which cannot be subsidized, nor can the time and labor necessary to the production of scientific results be bought and paid for on a basis similar to that upon which the skilled laborer is compensated. Scientific work is above all inspirational in character. It is as impossible to employ a scien-

tific investigator to work out the problem of pyorrhea, erosion, or caries at so much per day or per result as it would be to employ a humorist to be funny by the hour. The attempt to subsidize scientific effort is a self-limiting proposition which destroys the end it would create simply by substituting a material reward for that higher motive—the love of truth and of creative work—constituting the mainspring of all scientific work worthy the name. The material rewards of research must be honoraria in the literal sense of the term or else they become the stimuli of results that may well be questioned as to their value because of the motive which prompted their seeking.

The plans involved in the William Jarvie foundation and that of the New York Academy of Stomatology clearly avoid a common error in this class of scientific stimulus and make the reward something to be coveted by reason of the distinction which in a professional way each accords to the successful candidate. It is the "Well done, good and faithful servant" implication which attaches to these professional distinctions that makes them desirable, and we trust that the spirit which animates the donors is so broadly cosmopolitan that the whole world of dentistry may be given the opportunity to compete for them, thus giving to each the greatest possible professional value.

BIBLIOGRAPHICAL.

NOTES ON DENTAL PORCELAIN: A PRACTICAL TREATISE ESPECIALLY DEVOTED TO THE INTERESTS OF THE BEGINNER. By V. WALTER GILBERT, D.D.S. Over one hundred practical Illustrations. Philadelphia: The S. S. White Dental Mfg. Co. London: Claudius Ash & Sons, Ltd., 1905.

The greatest gift to art is a new material in which art may find a higher expression. Porcelain as a medium of dental art may be said to have had its inception during the time of Pierre Fauchard, if indeed it does not owe its birth to his fertile brain. Its intrinsic artistic qualities were slowly developed to such a degree of perfection as to finally render obsolete the use of ivory, bone, and all other materials, even natural human teeth, as prosthetic substitutes for lost dental organs. The distinctive qualities which make porcelain the most satisfactory substitute for the natural teeth are precisely those which make it equally desirable for the replacement of parts of tooth-structure destroyed by caries or otherwise. Until the invention of the metallic foil matrix in 1886 no satisfactory technique applicable to all classes of cavities was available, hence the use of porcelain as a restorative material in the treatment of teeth damaged by caries was confined to a limited range of special cases. The attractive possibilities of the material from an artistic standpoint stimulated invention, and the Land matrix was evolved, which gave a tremendous impetus to the use of porcelain as a

filling material, and developed an almost limitless variety of porcelain mixtures and modifications of technique, with the result that much confusion, both as to choice of methods and material, confronts the novice upon taking up this attractive field of work.

Restorative work in porcelain is still in the experimental stage. The fundamental questions of the chemistry and physical properties of the material, and how these latter are modified by variations in composition, are questions which it will take time and patience to elucidate.

Dr. Gilbert's work is, so far as we are aware, the first serious effort that has been made to deal with the porcelain question upon a practical and scientific basis. This he does by insisting that the student shall familiarize himself with the material before undertaking to practically use it in the treatment of cases. The author presents a systematic method for studying the behavior and properties of porcelain from a thoroughly practical standpoint, and he is correct in his judgment that, armed with the knowledge thus gained, the student will be properly equipped to do intelligent work for his cases. The author is well qualified by study and large experience to speak and write with authority on the porcelain question, and the work under consideration is a welcome and trustworthy addition to our knowledge of this important subject.

BOOKS AND PAMPHLETS RECEIVED.

Transactions of the College of Physicians. Third Series. Vol. XXVI.

Proceedings of the Academy of Natural Sciences of Philadelphia. Vol. LVII, Part I, 1905.

Les Injections Analgesiantes Loco Dolenti dans les Nevralgies Périphériques. Thesis by Dr. Octave Demaillasson. Paris: Imprimerie de la Faculté de Médecine, 1905.

La Stovaïne. By Dr. René Piédallu. Paris: Les Établissements Poulenc Frères. 1905.

Libro de Actas del II Congreso Internacional de la Prensa Médica (1903). Madrid: Imprenta de Ricardo Rojas. 1905.

Transactions of the Fourth International Dental Congress, St. Louis, Mo., 1904. Edited for the Committee of Organization by Edward C. Kirk, Wilbur F. Litch, and Julio Endelman. In three volumes. Vol. I. Philadelphia: Press of the DENTAL COSMOS. 1905.

REVIEW OF CURRENT DENTAL LITERATURE.

Conducted by JULIO ENDELMAN, D.D.S.

[*Revue de Stomatologie*, Paris, June 1905.]

EXPERIMENTS ON THE ANTISEPTIC VALUE OF COMMON SOAP. By Professor Rodet, Montpellier, France.

Professor Rodet (*Montpellier médical*) has studied the effect of soap solutions of 1:100 and 5:100 upon cultures of various kinds of bacteria, especially upon Eberth bacillus and the staphylococcus. He undertook his investigations in order to determine both the arresting and the bactericidal power of these solutions. Eberth bacillus will grow in a solution of 3:1000, but one of 5:1000 prevents the development of the organism. The staphylococcus can withstand a solution of 6:1000. The bactericidal action is more important. A 1 per cent. solution kills the Eberth bacillus in a few minutes and the staphylococcus in a few hours. The 5 per cent. solution is very powerful.

From these results the author concludes that common soap apart from its value as a cleansing agent is an antiseptic not to be disregarded.

[*Les Annales Dentaires*, Paris, June 1905.]

THE MEDICAL PRACTITIONER AND THE MOUTH. By Dr. Paul Le Gendre, of the Lariboisière Hospital.

The author calls attention to the advisability of examining the mouth thoroughly at stated periods, not only when this region is the seat of disease but likewise in the case of general or constitutional disorders. He discusses the evolution of the temporary teeth and asks whether there arise in the infant pathologic phenomena which might be properly termed diseases of dentition. To this query he answers in the negative, saying that while certain disease processes may appear during the dentitional period they cannot be considered, strictly speaking, as "diseases of dentition." Now, the reviewer asks, why can they not be considered diseases of dentition? Are not the symptoms of reflex nature often accompanying difficult dentition the immediate effect of irritation of the trifacial nerve-endings, through an undue degree of pressure by *contre-coup* against the highly vascular and sensitive pulp? In view of the fact that the author himself mentions insomnia, restlessness, and even convulsions as symptoms resulting through pain, the concomitant factor of pathological dentition, we feel at ease in dismissing this portion of his essay without further comment.

Referring to the symptoms about the mouth, Dr. Le Gendre calls attention to the significant fact that the salivary hypersecretion accompanying gingivitis becomes the cause of digestive disorders either because the excess of saliva is swallowed, and diluting the gastric juice causes dyspepsia, vomiting, and diarrhea, or else because if it escapes externally digestion is interfered with through insufficient insalivation. The gingivitis may spread, inducing secondary infection of the buccal cavity, and in this connection the author warns mothers and nurses against the use of the rubber nipple, as in this object the author sees the origin of microbic infection. Dropping from the mouth, it is returned not infrequently without first washing to remove whatever extraneous matter, dust, and microbes it may have gathered from the floor.

The author disapproves of the practice of lancing the gums upon the assumption that such a procedure opens a new avenue of infection, and also for the reason that if the gums be lanced prematurely, the resulting scar tissue being dense and resistant, will further interfere with the cutting process. The objection with reference to the probability of infection is hardly worthy of serious consideration, for in the case of an infant of average good health ordinary antiseptic precautions and hygienic surroundings would diminish to almost naught the possibility of

infection. As to scar tissue we know that it is of a lower degree of organization than normal tissue, and more easily broken down.

For these reasons and in order to eliminate all possible source of nerve irritation, to which may be traced the disorders which the writer does not deem advisable to classify under the head of diseases of dentition, the gums should be lanced deeply as soon as signs appear that the undeveloped organs are being held down by a thick covering of gum tissue.

The author also refers to the inflammatory phenomena at times accompanying the eruption of the third molar, and concludes his essay with a forceful plea for the prophylactic treatment of the mouth. He mentions a number of constitutional disorders traceable to carious teeth, such as dyspepsia, bronchitis, pneumonia, etc. To assist in the work of preserving the dental organs in fairly good health he recommends the following mouth-wash:

℞—Thymol,	gr. ij;
Benzoic acid,	gr. xlv;
Tincture of eucalyptus,	ʒijss;
Water,	Oij. M.

Sig.—For the antiseptic care of the mouth.

[*International Dental Journal*, Philadelphia, July 1905.]

A SIMPLE EFFICIENT CROWN FOR THE POSTERIOR TEETH. By Allison R. Lawshe.

For badly broken-down second and third molar teeth and for first molars not exposed to view, the writer recommends the following method of crowning:

Devitalize the pulp, if living, and prepare the root-canal as usual. Grind down the walls, if any remain, half way, and slope to the gum margin. Prepare a well-fitting band of gold, leaving space for cusps, as is usual with all-gold crowns, and make two countersunk holes on the buccal and two on the lingual side. Now coat the inside lower edge of this band with a layer of gutta-percha, that it may make a perfect fit when pressed to place, and after preparing good, substantial undercuts in the pulp-chamber, or the openings of the root-canals, warm and adjust it, wash the root-stump with alcohol, and carefully and thoroughly pack amalgam into the undercuts and all spaces between stump and band, filling the entire band and building cusps above it. The patient can then be instructed to bite, and the building and carving of the cusps continued until a perfect articulation is secured, when the crown may be considered finished. A tooth nearby should then be washed with chloroform, dried, and a ball of tough gutta-percha fastened thereto to prevent the possibility of damage to the crown by the occluding teeth before the amalgam has set.

[*British Dental Journal*, London, July 1, 1905.]

METEOROLOGICAL CONDITIONS AS AFFECTING NITROUS OXID ANESTHESIA. By Harvey Hilliard.

After an experience of nine years gained chiefly at the Royal Dental Hospital of London, the author has reached the conclusion that in order to obtain the best results in the administration of nitrous oxid gas, allowance should be made for weather conditions. In order to correctly judge the effect of any particular condition upon the character of the anesthesia produced by nitrous oxid, the author eliminated from his observations, as far as it was possible, all contributory factors which might be the cause of inaccuracies in the results.

Mr. Hilliard has found that variations in the atmospheric pressure did not have such a marked effect upon the anesthesia produced by gas alone as was observed when air or oxygen was administered with it, and the conclusions arrived at apply with much greater force to the administration. With gas alone and when the barometer was high, *i.e.* 30 inches or over, the induction of anesthesia was longer, there was less cyanosis, with a given depth of anesthesia, and distinctly less jactitation; the gas could usually be pushed even to the point of abolition of the conjunctival reflex on a high-barometer day without undue cyanosis or jactitation, whereas with gas alone on a low-barometer day it would be useless to try to abolish the conjunctival reflex in the hope of obtaining a longer anesthesia, because the patient would become so deeply cyanosed and jactitate so excessively that any increase in the duration of anesthesia would not be available for the operator, owing to the unsteadi-

ness of the head, the venous engorgement of the tongue, and the profuse bleeding. With an increase in the time of induction of anesthesia, the duration of available anesthesia also increases, and with a pressure of 30 inches of mercury or over, it was observed that the anesthesia was quiet and lasted nearly as long again as when the barometric pressure fell to below 29 inches. The recovery from the effects of the anesthetic is also more satisfactory on fine days; whereas, when the barometer is low, patients are more likely to complain of headache, or a sense of faintness, and are less inclined to get up and walk home immediately after the operation than when the atmospheric pressure is high. When administering nitrous oxid, during a fall in barometric pressure it will be found that cyanosis occurs very early, that in less than a minute jactitation will have become a prominent feature, while the pupils will have only begun to dilate, and that the conjunctival reflex at the same time will be brisk, although the breathing will have become stertorous. The available anesthesia will be short, and it would be dangerous to try and obtain a longer anesthesia by pushing the gas, on account of the increase in cyanosis with concomitant dilatation of the heart and displacement of the apex beat outward. Regarding the administration of gas with air, it was found that with a high barometer sufficient air could be given to eliminate the asphyxial factor, and that with a fall in the barometer the admixture of air does not tend to prevent asphyxia.

These interesting observations have led the author to formulate the following conclusions: That when the barometer is low no attempt should be made to abolish the ocular reflexes; that the administration should be stopped when jactitation shows itself in the orbicularis palpebrarum and other face muscles, when the breathing becomes stertorous and irregular, and when the pupils dilate. The author has found that better results are obtained when no air is given with the gas, for if sufficient be admitted to mitigate the asphyxial factor the patients are likely to be noisy and the anesthesia fleeting. When the barometer is low, ethyl chlorid mixed with the gas, according to Dr. F. W. Hewitt's method, gives better results for periods of narcosis of less than three minutes duration; but for longer anesthesias, after induction with nitrous oxid, a mixture of ethyl chlorid and chloroform, half a dram to the ounce, administered by means of a Junker apparatus, gives the most satisfactory results. Long operations should not be attempted when the barometer is low, and on the other hand, when the barometer is high, air or oxygen should always be administered with the gas, thus eliminating the asphyxial symptoms and inducing a long, quiet, sleep-like anesthesia.

[*l'Odontologie*, Paris, April 30, 1905.]

A CASE OF DENTAL TRAUMATISM TREATED BY REIMPLANTATION.

By Dr. Charles Godon, Dean of the Ecole Dentaire of Paris.

Dr. Godon relates an interesting accident case from his private practice. A boy aged twelve, while playing with some of his little friends, fell heavily upon his face. The impact was so powerful that it knocked out all the upper incisors except the right central which was driven deep into the jaw. The author, after considerable and difficult manipulations, succeeded in removing this tooth, and replanted it together with the remaining three incisors which were forced out from their alveoli at the time of the accident. In less than a month after the operation all ligatures were removed, as the teeth had thoroughly consolidated.

[*Revue Odontologique*, Paris, June 1905.]

FETOR OF THE BREATH.

There are numbers of people whose lives are rendered uncomfortable if not unhappy because of their being sufferers from the condition mentioned in the title of this review. If they should seek relief at the dentist's office the practitioner should inquire closely into the personal history of the patient and remember that an offensive breath is frequently one of the symptoms of either digestive or respiratory disorders. Dyspepsia, purulent bronchitis, inflammatory affections of the naso-pharynx, and chronic rhinitis are often the sources of this unpleasantness. If by a process of elimination these different disorders can be excluded, then the cause must be attributed to pathologic conditions within the mouth. Pyogenic exudation from

the alveoli, carious cavities, and broken-down crowns and roots may constitute the contaminating source of the expired air. The fundamental cause should be removed at once —filling the cavities, extracting those teeth and roots too far gone to admit of conservative treatment, and treating all diseased alveoli by the best available method. The following antiseptic mouth-wash is recommended:

R—Cherry-laurel water,	gr. 200;	
Tincture of benzoin,	gr. 100;	
Tincture of patchouli,	gr. 50;	
Labarraque solution,	gr. 30.	M.

Sig.—One tablespoonful in a glass of water. Use as gargle three times a day.

[*Archives de Stomatologie*, Paris, June 1905.]

THE DANGER ACCOMPANYING THE EXTRACTION OF TEETH DURING MENSTRUATION.

It is a generally accepted fact that menstruation exercises a certain degree of reflex influence over the mouth and teeth. Cases are on record in which during menstruation the surfaces of the teeth became hypersensitive and the patients suffered from neuralgia and tumefied gums. In one particular instance the capping of an exposed pulp and obturation of the tooth during the menstrual period was followed by excruciating paroxysms at each successive period. Observing gynecologists have reported cases in which the catamenial fluid gave way to buccal hemorrhage, chiefly from the gums.

Regarding the question of tooth extraction, the opinion of gynecologists is almost unanimous to the effect that no special danger accompanies the extraction of teeth during the menstrual period. However, Dr. Anoufriev, privat-docent at the Faculty of Medicine of Odessa, has lately reported the case of a woman who, immediately following the extraction of a tooth under chloroform anesthesia toward the end of the menstrual period suffered from a menorrhagia which, had it not been for the quick and heroic methods which were made to arrest it, would have caused the patient's death. It is true, Dr. Anoufriev says, that the curetting of the uterus showed that the organ was the seat of a glandular endometritis; but as at all the previous menstruations the discharge had been by no means abundant the conclusion must be reached that at least in this particular case the existing inflammation superinduced by the extraction was the cause of the hemorrhage.

[*Gazette hebdomadaire des Sciences Médicales de Bordeaux*, April 16, 1905.]

ABNORMAL MASTICATORY SOUNDS IN TABETICS. By Dr. J. Sabrazes.

The author has observed that in cases of locomotor ataxia the masticatory movements often give rise to crepitant sounds audible at a distance of several feet. The noise may be likened to that produced by the eating of toasted bread. The cause is to be found in the formation of rugosities upon the surfaces of the temporo-maxillary articulation.

[*Lancet-Clinic*, Cincinnati, April 8, 1905.]

REPORT OF 445 CASES OF NITROUS OXID-ETHER ADMINISTRATION, IN FURTHER RECOMMENDATION OF ITS ADVANTAGES FOR SHORT AND LONG GENERAL ANESTHESIA. By Dr. Robert Sattler, Cincinnati, Ohio.

After recalling the disadvantages of chloroform, ether, and some of the anesthetic mixtures, the author gives an account of his experience with the nitrous oxid-ether combination. The author has employed it in ophthalmic surgery in all cases in which local anesthesia was inadvisable, and also for adenoids, tonsil, and nasal operations.

Dr. Sattler has records of 445 cases. He administers by means of the Bennett apparatus. The bag for holding the nitrous oxid is never distended to its full capacity. The mask is placed over the patient's face and the nitrous oxid valve is opened, the gas being inhaled gradually, as the pressure in the nitrous oxid bag is made to remain far from the maximum. This the author states prevents the cyanosis which is always present when the gas is inhaled under great pressure. After a given number of inhalations the ether valve is gradually turned on until the patient inhales both nitrous oxid and ether. This he is allowed to do for about a half-minute, when the nitrous oxid is removed and the ether continued. Sufficient narcosis for minor operations may be had in about two and a half minutes, profound in about three min-

utes. With an operation lasting thirty to forty minutes, from four to six ounces of ether are used.

The unpleasant after-effects of the ordinary ether narcosis seldom occur, nausea and vomiting being unusual. Patients recover consciousness in about ten minutes.

[*Schweizerische Vierteljahrsschrift für Zahnheilkunde*, Zurich, June 1905.]

A FAMILY OF HEMOPHILIACS. By M. H. Lossen.

The Mampel family of Kirchheim, near Heidelberg, furnishes one of the most typical examples of hereditary hemophilia. The first hemophilic member of this family was studied by Von Chelius in 1827. In 1876 the personal histories of one hundred members of this family were recorded in a communication published during that year by Mons. Lossen. The history of the family up to date —the subject of the author's present communication—comprises the individual records of 212 members, divided as follows: 111 men, 96 women, and 5 still-births. From the interesting article before us we gather that not a single female member of the family inherited the diathesis. This observation is in perfect accord with previous statistics upon the subject of the hemorrhagic diathesis. Out of the 111 male members of the family, 33 were hemophiliacs and of these 18—more than one-half—died of uncontrollable hemorrhage, as follows: Hemorrhage of the umbilical cord 1; of the subcutaneous connective tissue and muscles 2; of the lip 5; of the gums 2; of the palatal vault 2; consequent upon cutaneous wounds 2; gastric hemorrhage 1; hepatic 1; cerebral 1; pulmonary 2.

The most common hemorrhages were those of the subcutaneous variety, which occurred in 16 out of a total of 33 individuals. These subcutaneous hemorrhages resulted from slight injuries. Next in the order of frequency are the hemorrhages caused by superficial wounds. In this group the writer includes nasal, labial, and gingival hemorrhages. Hematemesis occurred in two cases, of which one terminated fatally. Hemorrhage of the rectum caused by the passage of hard feces is recorded in one case, hematuria in three cases, hemoptysis, spontaneous or caused by slight effort, in four cases, hemarthrosis in nine cases (six in the knee joint). The diathesis manifests itself more intensely in young subjects and is likely to end fatally in the very Young. In a series of eighteen deaths, seven were of patients under three years, five between three and ten, one between ten and twenty, two between twenty and thirty, and two between thirty and forty. After the fortieth year the hemorrhagic tendency declines gradually.

The author's studies and observation have led him to conclude that women are rarely tainted by the diathesis, that marriage between a male hemophiliac and a healthy female will result in the procreation of healthy children free from the diathesis, and that on the contrary if the mother have the slightest trace of the diathesis, even if the father be absolutely healthy, they will procreate children in whom the diathesis will become manifest sooner or later.

[*Items of Interest*, July 1905.]

HAVE WE ANY FURTHER USE FOR AMALGAM? By R. Ottolengui, M.D.S., New York City.

The author has laid down the postulate that there is for each material some place where it is the very best reliance. The first situation under this class in relation to amalgam has to do with the crowning of teeth. Wherever a broken-down root is to be crowned with a shell crown it is Dr. Ottolengui's view that the natural tooth should first be protected by as perfect an amalgam filling as can be made. There are several reasons for this, and it is especially obligatory when decay or fracture has destroyed a portion of the tooth below the margin of the gum. The replacing of the lost part with amalgam renders the fitting of the gold band more easily possible and also painless. Again, it permits the insertion of a band which does not extend too far below the gum, and assures a tighter adaptation through the restoration of the circumference of the tooth-root to its full proportion. But even where the root is sound for some distance above the gum it is advisable to fill the cavity proper with amalgam and to build up as high as possible while leaving space for well-reinforced cusps. Treated in this manner there is less likelihood of subsequent decay under

the crown, and the crown is better supported with a minimum of cement, since the crushing stress will be better supported by a metal than by a large mass of cement.

For filling purposes we find that the first demand for amalgam is in those cavities which have extended far beneath the gum. While here the demand is for amalgam, success cannot be obtained without due observance of an exacting technique. Amalgam is chosen because it can be quickly and accurately packed into such places. It must be remembered, however, that no filling near the gum, nor beneath it, can be counted reliable unless absolutely smooth. In rare instances such cavities may be filled without the matrix, but he thinks it safer and wiser always to use a matrix of some sort.

After discussing the matrix problem and his method of finishing amalgam fillings, the author takes up those cases in which the use of amalgam is not indicated. In this connection the author states that in proportion as the patient is young the use of amalgam should be avoided. In temporary teeth amalgam should be restricted to occlusal cavities in the temporary molars which have surrounding walls. Whenever the cavity involves the approximal surface, gutta-percha is preferable. The latter material not only serves the purpose of saving the teeth but it also aids in the expansion of the jaws for the reception of the permanent organs. In the case of the permanent teeth, gold should be inserted as soon as possible after the onset of decay. If caries has progressed too far or the teeth are too sensitive, or the little patient be too refractory or too nervous for extensive operations, pink gutta-percha should be used until conditions make gold possible. Amalgam is less a tooth-saver in young than in adult mouths, and in these cases should be used as little as possible.

Aside from the large cavities referred to, amalgam may be used in mouths where the dentist finds that amalgam has been acting as a permanent filling without inviting recurrence of decay. The essayist emphasizes the necessity of properly finishing all amalgam fillings, as unfinished fillings will not preserve the teeth from caries. Thus the postulate is: Avoid amalgam in young mouths, and in adults be somewhat guided by the work that has gone before.

The author has studied the progress of eroded cavities under amalgam, and has found that at least in one particular case the amalgam had outlasted the gold and had served as a barrier toward the further disintegration of the tooth-substance. He adds, however, that more evidence along similar lines must be had before believing that amalgam will inhibit erosion.

In conclusion the author describes his method of removing defective amalgam fillings as follows: He uses a spear-pointed drill made especially sharp for the purpose; he prefers a drill because it cuts more rapidly and does not clog as a bur does. He drills a hole at the median line of the filling, and by moving the drill back and forth as it cuts he converts the hole into a slit. This slit is continued until the filling is actually divided into halves. One can easily tell by the sense of touch when the drill passes beyond the amalgam and reaches the dentin, when, of course, drilling in that particular direction is stopped. The filling thus cut in halves is easily removed in two pieces by pressing each piece toward the center.

PERISCOPE.

Hardening Plaster Models.—Plaster models of orthodontia cases, etc., may be hardened and given a marble-like surface by boiling them in stearin. The models must be thoroughly dry before putting them into the boiling stearin. Use a double boiler, like a glue-pot, for melting the stearin.—*Dental Register.*

A Laboratory Hint.—When working with wax in the laboratory, use a large common school slate for a bench cover; it will catch all pieces and drops of melted wax, and when removed leaves the bench clean and ready for the next work. Wax spots on a bench may be very annoying when gold work is being done.—*Dental Register.*

Easy Method of Removing Regulating Bands.—To remove regulating bands or crowns, grasp the band with forceps and squeeze with firm pressure, repeating the process around the tooth if possible. This will loosen the cement and may even expand the band so that it can be easily removed.—F. W. Stephan, *Dental Review.*

Cocain Anesthesia.—Means says that Reclus, who reports 7000 operations under cocain anesthesia without a death, insists on the observance of the following rules: (1) Never use a stronger solution than 5 per cent. externally, or 1 per cent. hypodermically. (2) Always have the patient recline during the administration of the anesthetic and not get up for half an hour after. (3) Always have the patient eat and drink something before rising.—*Columbus Med. Journal.*

A Reinforced Wedge.—This form of wedge is particularly applicable for cases wherein it becomes necessary to wedge across wide spaces, as in regaining the space of a missing tooth. It consists of the usual piece of cottonwood which has been compressed with the pliers or vise and carved to the desired size and shape. Through the wedge thus prepared a hole is drilled, and into it is threaded and compressed a large piece of ordinary separating rubber. The principle of it is, that after the wood has expanded to its limit it will relieve the pressure on the rubber, which will attempt to resume its original shape, thus forcing the sides of the wedge farther apart.—Frederick Crosby Brush, *Dental Brief.*

Darkening the Shade of "Phosphate" Fillings.—By using a German silver spatula the shade of these fillings can be darkened to a great extent, and the color produced is permanent, no doubt due to the action of the fluid upon the metallic spatula. With a little practice a great variety of shades can be produced. The darkest shades are produced by prolonged use of the spatula. —Walter Harrison, *Brit. Dental Journal.*

Precautions when Taking Plaster Impressions.—When impressions are to be taken, note all conditions of the mouth carefully. If a thick, viscous saliva be present, it may be overcome by rinsing the mouth thoroughly with milk of magnesia. The adhesion of the impression material to the teeth may be prevented by coating them slightly with vaselin, or by rinsing the mouth with milk of magnesia just before the operation.—*Dental Register.*

Pulp-Capping Material.—Dry the cavity, then coat the exposure with a chloroform solution of gutta-percha, drying this by means of the chip-blower before placing the cement-filled shells in position. As a bar to thermal changes, and—what is perhaps quite as important—those sometimes charged against the chemical action of the phosphoric acid, it meets the requirements as perfectly as anything else within our reach.—W. A. Bostwick, *Dental Office and Laboratory.*

Abscess Treatment.—A prolific source of septic pericementitis is escaping micro-organisms and ptomaines from putrescent root-canals, but in many instances abscesses may be prevented by the use of proper remedies at the proper time. The first duty is to open the canal, and let the confined gases escape. Both the tooth and the infected peridental membrane require treatment. To aid nature in readjusting the abnormal condition the following prescription will prove useful:

℞—Potass. iodidi, ʒj;
Syrupi sarsaparillæ comp., fʒiij.
M.

Sig.—Take a teaspoonful three times a day after meals.

The teaspoonful may be added to half a wineglassful of water to further dilute the potassium iodid.—J. P. Buckley, *Dental Review.*

A Simple Protector for the Hot-Air Syringe.—The metal portion or end of the syringe may be covered with a piece of white rubber tubing of the same diameter; the tubing to be about an inch shorter than the metal end. When in use, the tubing is to be drawn up on the metal toward the bulb, exposing the tip for heating; after which the tubing is pushed out so as to cover the point, thus confining the heat and, being a non-conductor, effectually preventing the burning of the lips or mucous tissue.—Frederick Crosby Brush, *Dental Brief.*

To Hold Crowns While Polishing.—Cut a pine stick to fit the crown loosely, coat it with shellac by heating both in a flame, then force it into the crown, previously filled with a mix of salted plaster, and it is ready for the buff. To remove the crown heat in a flame, and with a napkin to protect the fingers, pull it from the stick. Lac on the stick prevents the wood from drinking in the water of the plaster, and when heated, makes the stick easy of removal. The salt hardens the plaster immediately, and the heat generated in the buffing and that of the flame perfects it, and as a final result the plaster comes away in scales, leaving the inner surface of the crown as clean as when first made ready for the polishing process.—*Office and Laboratory.*

Tooth-brushes.—I have no use for the soft, mushy tooth-brush sometimes advocated, except in very rare cases. I want a tooth-brush with some backbone to it, with some substance to it. It should be small, but full of good stiff, elastic bristles. Small, to reach every part of the mouth; stiff, to give good stimulating friction to both tooth and gum; straight, not curved, because then best adapted to reach the surfaces on both sides of the arch. It should be used in all directions, vertically and horizontally. The "tooth-pick" idea, associated with the dozen or more little bristles at the end of the curved brushes, does not appeal to me at all. For daily use to remove particles of food, to brush out the softer *débris*, it is a necessity. In order to keep it in good condition for this purpose and preserve its vitality longer, one should have two or three always in commission for alternate use. As a polisher, however, the tooth-brush is utterly inadequate, because even with the use of a good powder it fails to entirely remove the adhesive deposits, which are so prevalent and so mischievous to the teeth, and there are too many places inaccessible to the brush.—Chas. B. Rohland, *Dental Review.*

Soldering Plates Together Objectionable Practice.—I object to soldering plates together to stiffen them. A plate that is so constructed has lost all its elasticity; when bent it stays bent. It is better to have one plate of sufficient thickness to give the stability required, than to solder two plates together. I do not object to the use of 18-k. gold in the mouth. I use it a great deal, especially in the lower teeth. There is one great objection to the use of a higher grade gold: it is softer, more easily adapted to the mouth, and consequently cannot bear the strain in the mouth so well. For partial plates I frequently use the alloy of gold and platinum called clasp metal. If rubber adheres to 18-k. gold, so much the better; that is the gold to use, and not the higher grade.—G. W. Haskins, *Dental Review.*

Gingivitis.—The following combinations are recommended by *Merck's Archives* in the treatment of gingivitis:

℞—Salol,		gr. xv;
Spts. menth. pip.,		ʒx;
Tinct. catechu,		ʒj.
		M.

Sig.—One teaspoonful in half a glass of warm water as a mouth-wash; or:

℞—Acidi carbol.,		
Pot. chloratis,	āā	gr. xx;
Syrupi simp.,		ʒj;
Aq. camphoræ,		ʒiij.
		M.

Sig.—One dessertspoonful as a mouth-wash, diluted in half a glass of water.—*Monthly Cyclopedia.*

Practical Things that Count.—A small piece of pure soap will be found useful in many ways during operations. The mouth-mirror may be kept from clouding by coating the glass with dry soap, and then wiping clean with a dry napkin. The edge of a sand-paper disk will not catch in the rubber dam when polishing fillings, if it is first run in the soap. Disks and strips will cut faster and polish better if slightly soaped on the grit side before using. Disks and strips thus prepared that are used for polishing gold fillings, will retain the particles of gold, and if saved and refined will more than pay for the trouble. Rubber dam will slip easily over the teeth if soaped around the holes. Ligature silk when soaped slips easily between the teeth. Use pure soap and sparingly, and it will not be disagreeable to the patient.—*Dental Register.*

What an Unclean Mouth May Lead To.—The observations of Miller and Macfadyen have shown that only a portion of the large number of organisms which obtain access to the stomach is destroyed by the gastric juice, and that it is only when the acidity is considerable—after meals—that such destruction takes place. Consider, then, the result of constantly swallowing septic organisms which have survived a period of existence in the saliva, into a stomach where the normal acidity has been diminished by constant catarrh. It is obvious that the opportunities of the bacteria would be very great, especially between meals, and according to Dr. William Hunter, who has done so much work on this subject, an actual infection of the mucosa with pathogenic organisms may occur. Thus a septic catarrh is set up, followed later by increase of connective tissue and glandular atrophy. I cannot do better than quote Dr. Hunter's words, in which he summarizes the symptoms: "The ashy-gray look and general languor which such patients in one's experience characteristically present are really manifestations of long-continued septic absorption; the local symptoms of clamminess of the mouth, distaste for food, coated tongue, and bad taste in the mouth, which one simply looks upon as manifestations of gastric catarrh, are really the result of oral sepsis; while the nausea, indigestion, and gastric discomfort are the result of 'septic' gastric catarrh, produced by direct infection of the stomach with the pus-organisms."—NORMAN G. BENNETT, *Brit. Dental Journal.*

HINTS, QUERIES, AND COMMENTS.

ARTIFICIAL TEETH IN TALMUDIC LITERATURE.

DR. V. GUERINI'S article on "Dental Art among the Romans and Etruscans" impelled me to look up some Hebrew literature of the same period, and I was surprised to find more than I was looking for. The Babylonian Talmud (English edition by Dr. Michael L. Rodkinson) furnished all the facts indirectly. The entire Talmud contains two distinct departments—(1) Mishna and (2) Gemara. The Mishna was compiled in Palestine by Rabbi Jehuda Hanasi at the beginning of the second century, and was divided into sections. The Gemara is a compilation of discussions and commentaries upon the Mishna. The discussions were carried on in colleges in Babylon especially established for such purposes, during a period of five centuries, and were finally concluded with the injunction that "nothing more be added."

In the volume named "Sabbath," chap. vi, there is a list of articles which one is forbidden to carry along on the day of Sabbath, according to the Jewish faith, and among these the following occur: "It is forbidden to carry the Thathabath tooth, the gold tooth, and the silver tooth." What is a "Thathabath" tooth? The commentary of Rashi explains that it is a tooth of a human being placed within the space of a missing tooth, and held by the mere pressure of the walls of the adjoining teeth—an explanation not very easily understood.

The gold and silver teeth are coverings, according to the shape and size of the tooth, for the purpose of concealing any defect in a tooth, or for preserving a tooth from further decay. (It is understood that Miller's theory was not known at that time.) The gold or silver tooth used to be worn loose, in order that it might be taken off without difficulty when food accumulated or when repolishing was desired. Here we have the nucleus of the present removable bridges.

Among the articles allowed to be carried on the Sabbath we find mentioned in the same chapter some trinkets serving as accessories to the toilet of the fair sex, as necessary to personal health, or in emergency cases. They are the following: A grain of pepper and a grain of salt—the former as a deodorant for the breath, and the latter as a remedy for toothache—or whatever else she is accustomed to keep in her mouth (meaning ginger or cinnamon), also cachous for purifying the breath.

A very curious remedy is also mentioned; "eggs of grasshoppers" for toothache. For the relief of insomnia, the tooth of a fox is spoken of.—BENJ. A. KREIDMANN, D.D.S., 534 E. Eleventh st., New York city.

OBITUARY.

DR. GEORGE C. BATES.

Died, at his residence, 19 Hurd st., Lowell, Mass., April 22, 1905, of uremia, George C. Bates, D.D.S.

Dr. Bates was born in Worcester, Mass., October 28, 1862. He began the study of dentistry under Dr. Chamberlain of South Framingham, Mass., completing his professional education at the Boston Dental College, from which institution he was graduated with the class of 1884. Dr. Bates was prominent in the professional and social circles of Lowell, and a member of several secret societies.

He is survived by his widow, *née* Addie Donnelly of Lowell, and by a daughter, Blanche G. Bates.

DR. FREDERICK BEVERLY NESBETT.

Died, at his residence, 298 Union st., New Bedford, Mass., June 8, 1905, from blood poisoning, Dr. Frederick Beverly Nesbett.

The deceased was born in St. Stephen, New Brunswick, March 13, 1842.

In June 1861, at the first call for volunteers, he enlisted in Company B, Fifth Maine Volunteers, to serve three years. He was widely known as a member of the Grand Army, and had an excellent military record.

In January 1865, he entered upon the study of dentistry under Dr. Jeremiah Mason of Saco, Me. He practiced in Saco until 1868. From 1868 to 1870 he practiced in Bahia, Brazil, and in 1870 and 1871 he practiced in New York city. Late in 1871 he started practice in New Bedford and was in active practice up to the time of his late illness, a longer continuous practice than any other dentist now living there. He was widely known in his profession throughout the state.

Dr. Nesbett was twice married, his first wife being Lydia B., daughter of James and Lydia Mendall of New Bedford, to whom he was married February 28, 1871. In 1874 he married Eunice B., daughter of Charles and Judith Kelley of Sidney, Me. A widow and two sons survive. The eldest son is Dr. Norman B. Nesbett, a dentist of New Bedford, and Ralph W. Nesbett, the younger son, is now actively engaged in commercial pursuits.

DR. EVERARD G. REYNOLDS.

Died, at West Newfield, Maine, May 10, 1905, Everard G. Reynolds, D.D.S.

Dr. Reynolds was born in Milton Mills, N. H., September 23, 1852. He studied dentistry under Dr. Julius Guiltman of Sommersworth, N. H., and at the Philadelphia Dental College, from which institution he received the D.D.S. degree in 1875. Dr. Reynolds was a popular practitioner of unusual ability, and a gentleman of pleasing personality. He was married in 1876 to Miss Narcissa T. Davis of West Newfield. He is survived by his widow and one daughter.

DR. JOHN R. CLAYTON.

Died at Shelbyville, Ind., January 6, 1905, of diabetes, John R. Clayton, D.D.S.

Dr. Clayton was born in West Liberty, Champaign County, Ohio, January 23, 1842. He attended the common schools of his district and soon gave evidence of more than ordinary ability in the acquisition of knowledge. In 1861 he enlisted in Company C, 13th Ohio Volunteer Infantry, for three months' service. In November of the same year he again enlisted in Company G, 60th Ohio, for three years, and in December 1863 re-enlisted as a veteran volunteer in the same regiment, and served until the end of the war. He participated in the following battles and campaigns: First campaign of the Shenandoah valley, Fort Republic, Chancellorsville, Gettysburg, Atlanta campaign, Sherman's march to the sea, and many minor engagements. He entered the war as a private, and left it with the rank of captain.

After the war he returned to Ohio, and

taught school for a short time. He then moved to Wabash, Ind., where he began the study of dentistry as apprentice to Dr. John Bechtel. This association with Dr. Bechtel lasted until the beginning of 1867. He first practiced in Peru, Ind., and in April 1867 removed to Shelbyville, where he practiced uninterruptedly until a few days before his death. He received the D.D.S. degree from the Ohio Dental College, where he lectured in the capacity of professor of physiology and histology from 1879 to 1885.

Dr. Clayton was one of the most prominent men of his community, both socially and professionally. The rectitude of his character, his love of truth and justice, and his innate cordiality won for him a large circle of admiring friends and a most lucrative practice.

He took a pronouncedly helpful interest in matters pertaining to his profession, and was an active participant in the meetings of the Mississippi Valley Dental Association, the Ohio Dental Association, and the Indiana Dental Association, of which he had been a member for many years.

He was married in December 1868 to Miss Mary E. McIlvaine of La Fontaine, Ind., who survives him, together with his mother, five half-brothers, and three half-sisters.

DR. JOHN WELCH.

Died, at his home in Portland, Ore., July 11, 1905, Dr. John Welch.

Dr. Welch was born at Mineral Point, Wis., in 1836, and was the oldest practitioner of dentistry in the city of Portland. He received his academic education at the Rock Island (Ill.) Seminary, and began the study of dentistry with Dr. W. J. Lawrence of Lyons, Ia. He was married to Miss Elizabeth Clements in 1857, and moved to Oregon in 1863, settling first at Oregon City, where he entered upon the practice of his chosen profession and where he remained until 1870, when he moved to Portland.

Dr. Welch's life was one of unusual activity, professionally and otherwise. The principles upon which he molded his life and to which he closely adhered are those which necessarily lead to the accomplishing of all that is worthy of being pointed out to the growing generation as the noble acts of a noble man. Every phase of his life bears the stamp of his enthusiasm as a worker, his sincerity as a friend, and his willingness to lend assistance to the worthy and ambitious beginner. Many young men in and out of the profession have been materially and mentally benefited by him, and his absence from their midst has brought them to a fuller realization of his exemplary qualities.

Dr. Welch was one of the founders of the North Pacific Dental College and was largely responsible for the progress which the institution has accomplished since its organization. He also served for some time on the State Board of Dental Examiners. He was a member of the I. O. O. F.

While Sylvester Pennoyer was mayor of Portland, Dr. Welch was appointed a member of the Board of Fire Commissioners, serving two years. He was a genial citizen, well known and popular in Portland and in the state. He was delegate to both conventions which nominated Bryan.

He leaves a wife and the following children: Dr. William Edward Welch, Pittsburg, Kans.; Dr. John C. Welch, Mrs. E. E. Caywood, Henry, Catherine, Reuben, Annie, and Benjamin, Portland. He also leaves a brother, W. M. Welch of Silverton.

DENTAL LEGISLATION.

NEW DENTAL LAW FOR THE STATE OF CONNECTICUT.

[FILE No. 464.]

AN ACT REGULATING THE PRACTICE OF DENTISTRY AND THE EXAMINATION AND REGISTRATION OF DENTAL PRACTITIONERS.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

SECTION 1. Chapter 277 of the general statutes is hereby amended to read as follows: The governor shall, on or before the first of July, biennially, appoint five dental commissioners, who shall hold office for two years from the first of July in the year of their respective appointments and until their successors shall have been appointed and qualified.

SEC. 2. No person shall be appointed a dental commissioner who shall not have been, for at least ten years next previous to such appointment, a practitioner in dentistry in this state, and in good standing in his profession. Said commissioners shall appoint one of their number to be their official recorder, who shall keep a record of their official proceedings, and copies of said record certified by him shall be legal evidence. The comptroller shall provide a suitable place in the capitol for said commissioners. The commissioners shall meet in July of each year and at such other times as they shall designate. They shall give due notice of every meeting by advertising the time and place thereof, for two months successively, in three dental journals circulating in this state. They may make rules of procedure for the regulation of all applications and hearings before them.

SEC. 3. No person shall engage in the practice of dentistry unless such person shall have first obtained from said commissioners a license. This section, however, shall not apply to persons engaged in the practice of dentistry who registered as dentists in this state prior to December 1, 1902, pursuant to the laws in force at the time of their license and registration.

SEC. 4. Every application for such license shall be in writing, signed by the applicant, and no license shall issue to any person unless he shall have received a diploma or other sufficient certificate of graduation from some reputable dental college, or medical college, conferring a dental degree, having a department of dentistry, and recognized by the National Association of Dental Examiners, or unless he shall have spent five years under the instruction of a licensed or registered dentist, or unless he shall have had at least three years continuous practice as a legally qualified dentist. All requisites under this clause shall be proven by documentary evidence, which shall accompany the application for examination.

SEC. 5. Every applicant for a license shall be examined by said commissioners as to his professional knowledge and skill before such license shall be granted, and they may refuse to grant a license where they are satisfied that the applicant is unfit or incompetent; they may, for good and legal cause, revoke any license that has been granted, and may prohibit any dentist in lawful practice from further practice, on satisfactory proof that such dentist has become unfit or incompetent. Cruelty, incapacity, unskilfulness, gross negligence, indecent conduct toward patients, or such unprofessional behavior as shows unfitness on the part of the dentist, shall be sufficient cause for the revocation of a license, or prohibition to practice; whenever complaint shall be made to a commissioner against a dentist, said commissioner shall investigate the matter, and on finding probable cause shall notify the party complained of to appear before the dental commissioners and show cause why he should not be prohibited from practice or why his license should not be revoked.

SEC. 6. Every such notice shall be in writing and signed by the recorder, and shall contain a statement of the causes for which such prohibition or revocation is claimed, and shall specify the place and time for the hearing, which shall be at least twelve days after the service of such notice. Said notice may be served by leaving a copy thereof, attested by the recorder, at the place of business of the party complained of, or at his last usual place of abode, or by sending the same by mail.

SEC. 7. Every dentist who shall at any hearing before the commissioners, either by himself or by his procurement, make a false statement or misrepresentation with intent to deceive said commissioners, shall forfeit his license, or be prohibited from practice.

SEC. 8. Every dentist aggrieved by the action of said commissioners in the revocation of his license or prohibition from his practice, may apply to the superior court, or court of common pleas, in the county in which he resides, for a writ of mandamus requiring them to revoke their decision, if the same be found, on hearing, to have been erroneous. Such application for mandamus may be served on said commissioners by leaving with the recorder or at his usual place of abode an attested copy thereof within twelve days after said commissioners shall have notified such dentist of their decision.

SEC. 9. Upon the payment of a fee of twenty-five dollars the dental commissioners shall, at their meetings, examine applicants and grant licenses to such applicants as they shall find qualified. An applicant who fails to pass a satisfactory examination shall be entitled to a re-examination at the next meeting of the commissioners, without a fee, but for any examination at a subsequent meeting a fee of five dollars shall be paid.

SEC. 10. The recorder shall keep an account of all moneys received by him, and shall, annually, in November, render his account to the comptroller; and shall pay from the moneys received by him all proper bills for the services and expenses of the commissioners and recorder, and for all necessary books and stationery, and shall keep all files, receipts, and records in his possession and deliver the same to his successors in office.

SEC. 11. The provisions of this chapter shall not prevent a practicing physician or surgeon from the performance of any operation in dentistry on a patient under his charge, nor a visiting clinician at a meeting of a regularly organized dental society, nor the student of a licentiate from assisting the latter in his performance of dental operations while in the presence and under the immediate personal supervision of his instructor; nor shall any lawfully practicing dentist be prohibited hereby from availing himself of the services of any pupil, student, or assistant employed by him and under his immediate supervision; *provided*, that nothing in this act shall be construed to permit the performance of independent dental operations by an unlicensed person in any locality, building, or office, separate and apart from the building or office which the licensed dentist who is the instructor of such pupil, student, or assistant, makes his own daily and permanent place for his own regular professional services.

SEC. 12. Said commissioners shall make an annual report of their proceedings to the governor.

SEC. 13. The dental commissioners may, in their discretion, without examination, issue a license to any reputable dentist of good moral character who shall have been in legal practice for five years or more in some other state or territory, upon the certificate of the board of dental examiners, or a like board of the state or territory in which such dentist was a practitioner, certifying to his competency, and that he is a reputable dentist of good moral character, and upon the payment of a fee of twenty-five dollars to said commissioners.

SEC. 14. Any duly licensed or registered dentist who is desirous of changing his residence from this to another state shall, upon application to the dental commissioners, receive a certificate which shall attest that he is a duly licensed or registered dentist in this state; and said certificate shall be given without the payment of any fee therefor.

SEC. 15. Every person hereafter licensed or registered by said commissioners to practice dentistry shall notify, in writing, the recorder of the commissioners as to the county and town in which he locates for the practice of dentistry; and if any licensed or registered dentist shall desire to remove his practice or any part thereof to another town or county, or regularly engage in practice in another town or county, he shall, in writing, notify the recorder as to the town and county in which he so locates. Failure, neglect, or refusal on the part of any such person to notify the recorder as aforesaid, shall be deemed to be a violation of the provisions of this chapter and punishable as hereinafter provided.

SEC. 16. Every person who shall knowingly and falsely claim or pretend to have or hold a certificate of registration or license, diploma, or degree granted by a society or by the board of dental commissioners, or who shall falsely and with intent to deceive the public claim or pretend to be a graduate from any dental college, not being such graduate, or who shall append the letters B.D.S., D.D.S., D.M.D., M.D.S., or L.D.S., to his name, without having had duly conferred upon him, by diploma from some college, school, or board of examiners legally empowered to confer the same, the right to assume said titles, shall be punished as hereinafter provided.

SEC. 17. Every person who shall violate any of the provisions of this chapter shall be fined not more than one hundred dollars, or

imprisoned not more than six months, or both; and the unlawful practice of dentistry for each week shall be a separate offense. The county health officer of the county within which any such violation occurs or is committed shall have jurisdiction to prosecute therefor.

SEC. 18. This act shall take effect from its passage.

Signed by the Governor, June 15, 1905.

SOCIETY NOTES AND ANNOUNCEMENTS.

DENTAL SOCIETY MEETINGS: August, September, and October 1905.

AUGUST.

INTERNATIONAL DENTAL FEDERATION. Hanover, Ger., August 7th.

VIRGINIA STATE DENTAL ASSOCIATION. Lynchburg, three days: August 2d to 4th.

SEPTEMBER.

AMERICAN SOCIETY OF ORTHODONTISTS. Chicago. Three days: September 28th to 30th.

NORTHERN INDIANA DENTAL SOCIETY. Logansport. Two days: September 19th and 20th.

OCTOBER.

SOUTHWESTERN IOWA DENTAL ASSOCIATION. Creston. Two days: October 10th and 11th.

Examiners' Meetings.

RHODE ISLAND BOARD OF REGISTRATION. Providence. October 3d to 5th.

"F. D. I."

INTERNATIONAL DENTAL FEDERATION.

THE President of the F. D. I. desires the announcement to be officially made that the meeting called to convene in Hanover on August 7th is not to be a general meeting, but simply a meeting of the Executive Council and of the several Commissions.

The following business will be transacted:

1. Report of the President.

2. Reports of the various national committees on recent actions taken in their respective countries in the matter of public dental hygiene and dental education.

3. Determination of the relation of the F. D. I. to the various national committees.

4. Relation of the national committees to the representative bodies of their respective countries.

5. Qualification for membership in certain cases where difference of opinion may arise.

6. The question of the advisability of publishing a pamphlet on the care of the teeth in such form as to be made accessible to the poorer classes.

7. The question of the possibility of manufacturing a tooth-brush at a price which will put it within the reach of the poorer classes. (Haderup.)

8. A discussion of the question: In what lines is the activity of the F. D. I. to be developed in the immediate future?

The Commissions thus far established by the F. D. I. are—

1. The International Commission on Education.

2. The Commission on Hygiene and Public Dental Service.

3. The Commission on the International Press.

4. The Commission on Jurisprudence and International Ethics.

To be organized: The Commission on Nomenclature.

EDWARD C. KIRK, *Secretary-general.*

VIRGINIA STATE DENTAL ASSOCIATION.

The regular annual meeting of the Virginia State Dental Association will be held at Lynchburg, Va., August 2, 3, and 4, 1905.

The profession are most cordially invited to attend.

J. Hall Moore, *Cor. Sec'y*,
Richmond, Va.

NORTHERN INDIANA DENTAL SOCIETY.

The next annual meeting of the Northern Indiana Dental Society will be held at Logansport, Ind., September 19 and 20, 1905.

Francis M. Bozer, *Sec'y*,
Logansport, Ind.

AMERICAN SOCIETY OF ORTHODONTISTS.

The next meeting of the American Society of Orthodontists will be held at Chicago, September 28, 29, and 30, 1905.

Anna Hopkins, *Sec'y*,
St. Louis, Mo.

SOUTHWESTERN IOWA DENTAL ASSOCIATION.

The ninth annual meeting of the Southwestern Iowa Dental Association will be held at Creston, Iowa, October 10 and 11, 1905.

Geo. Brooks, *Sec'y*,
Greenfield, Iowa.

COLORADO STATE DENTAL ASSOCIATION.

The Colorado State Dental Association held its nineteenth annual meeting at the Alta Vista Hotel, Colorado Springs, Colo., Tuesday, Wednesday, and Thursday, June 20 to 22, 1905.

The following officers were elected: W. T. Chambers, Denver, president; J. Allen Smith, Colorado Springs, secretary; Wm. Smedley, Denver, treasurer.

The next meeting will be at Fort Collins, Colo.

H. W. Bates, *Sec'y*,
Denver, Colo.

HARVARD DENTAL ALUMNI ASSOCIATION.

At the thirty-fourth annual meeting of the Harvard Dental Alumni Association, held in Boston, Mass., June 26, 1905, the following officers were elected for the ensuing year: Ned A. Stanley, '84, New Bedford, Mass., president; Arthur W. Eldred, '90, Worcester, Mass., vice-president; Waldo E. Boardman, '86, Boston, Mass., secretary; Harold DeW. Cross, '96, Boston, treasurer. Executive Committee, Waldo E. Boardman, '86 (*ex-officio* chairman); Walter A. Davis, '01, Boston, and Arthur A. Libby, '99, Boston.

The Council is composed of the officers.

Waldo E. Boardman, *Sec'y*,
Boston, Mass.

RHODE ISLAND BOARD OF REGISTRATION.

The Rhode Island Board of Registration in Dentistry will hold its next meeting for the examination of candidates at the Statehouse, Providence, R. I., Tuesday, Wednesday, and Thursday, October 3, 4, and 5, 1905.

Application blanks may be obtained of the secretary, and must be carefully filled in and returned, together with the fee of twenty dollars, not later than September 25th.

W. S. Kenyon, *Sec'y*,
301 Westminster st., Providence, R.I.

NEW YORK INSTITUTE OF STOMATOLOGY.

Offer of Prizes.

With the desire of stimulating investigation in any field of activity directly relating to Dental or Oral Science, the New York Institute of Stomatology offers two prizes for

the best papers submitted to it embodying the results of such original research.

The first prize, for the best paper, will be a gold medal and $250; the second prize, for the next best paper, a gold medal and $100.

Conditions: (a) The papers offered for competition must be typewritten in English. (b) Must contain not less than 1500 nor more than 3500 words. (c) Must be signed by a motto or *nom de plume.* (d) Must be accompanied by a sealed envelope marked with the same motto or *nom de plume* on the outside, containing the true name as well as the motto of the contestant within. (e) Must be sent to the chairman of the Executive Committee, Dr. F. Milton Smith, 38 West 36th street, New York city, on or before March 1, 1906.

Judges: The following gentlemen have consented to act as judges—Dr. C. N. Johnson of Chicago, editor of *Dental Review;* Dr. Eugene H. Smith of Boston, dean of Harvard University Dental School; Dr. Wilbur F. Litch of Philadelphia, editor of *Dental Brief.*

Rules.

1. The papers will be sent to the judges without the sealed envelopes, containing the names of the contestants, which will be retained by the Executive Committee till the decision of the judges is made.

2. In deciding on the merits of papers offered in competition the judges will be requested to take into consideration the value and character of the research work the results of which are presented, more than the literary character of the essays, but to give the latter due credit.

3. The judges are expressly authorized to decide which if any of the papers submitted to them are of sufficient merit to entitle them to the prizes offered, or to withhold the award from all the papers if none are deemed worthy.

4. Authors of the prize papers will be invited to read their essays before a meeting of the Institute, as will the writers of other papers of especial merit, the Institute reserving the right to the first publication of all papers offered in competition.

Papers not used will be promptly returned to the writers. Those read before the Institute will be as fully discussed as possible and when published will be adequately illustrated.

For further information address

Dr. F. Milton Smith,
38 West 36th st., New York, N. Y.

DENTAL COLLEGE COMMENCEMENTS.

KEOKUK DENTAL COLLEGE.

The annual commencement exercises of the Keokuk Dental College were held in the Keokuk Opera House, Iowa, Tuesday, April 25, 1905.

The doctorate address was delivered by Henry E. W. Barnes, M.D.

The degree of Doctor of Dental Surgery was conferred by the president, Prof. George F. Jenkins, A.M., M.D., on the following graduates:

Mark S. Bennett.....South Dakota	Aubrey Justice .....Missouri
Martin P. Bomke .....Iowa	Oscar Knoll .....Iowa
Harry Bowles ..... Iowa	Thomas Meara ..... Missouri
Scott P. Bowyer .....Illinois	W. Clifford Shaw ..... Illinois
M. M. Carpenter .....Iowa	Orin L. Sohl .....Iowa
George M. Covell .....Illinois	Arthur B. Thompson .....Iowa
John T. Crouch .....Kansas	Rodney E. Tull ..... Illinois
Charles Curless .....Wisconsin	Leroy H. Wolfe .....Pennsylvania
John Elliott .....North Dakota	J. Leroy Young .....Iowa

LOUISVILLE COLLEGE OF DENTISTRY.

THE annual commencement exercises of the Louisville College of Dentistry were held in Macauley's Theater, Louisville, Ky., May 9, 1905.

An address was delivered by Hon. R. W. Bingham.

The degree of Doctor of Dental Surgery was conferred on the following seniors and graduates:

†G. M. Adams ..... Kentucky
†R. S. Allan ..... Kentucky
S. W. Alvis ..... Kentucky
E. A. Anderson ..... Maine
J. A. Anderson ..... Kentucky
M. J. Austin ..... Texas
Benjamin J. Averett ..... Kentucky
C. K. Bailey ..... Mississippi
*S. R. Baker ..... Kentucky
*R. A. Baldwin ..... Kentucky
†T. M. Bass ..... Kentucky
B. E. Bell ..... Texas
†F. S. Bell ..... Kentucky
G. G. Bell ..... Kentucky
Paul E. Berndt ..... Texas
F. P. Best ..... North Carolina
*L. A. Blacklock ..... Kentucky
*H. C. Bloodworth ..... Mississippi
*C. M. Bowles ..... Kentucky
*J. G. Bowles ..... Kentucky
C. H. Brockmeyer ..... Illinois
Angel Cevera ..... Cuba
Grotius B. Claxon ..... Kentucky
Jesse H. Coffman ..... Kentucky
W. H. Cox ..... Kentucky
H. G. Cunningham ..... Kentucky
†B. H. Dale ..... Indiana
F. E. Day ..... Indiana
M. K. Denny ..... Kentucky
M. M. Dexter ..... Kentucky
†W. S. Diller ..... Kentucky
Ashley B. Dixon ..... Missouri
L. H. Dodson ..... Kentucky
J. A. Dow ..... Canada
W. P. Duley ..... Kentucky
†Herman L. Eager ..... Kentucky
E. C. Elliott ..... Kentucky
C. I. Faison ..... Alabama
J. W. Finklea ..... South Carolina
†J. J. Forestner ..... Kentucky
†Mrs. E. A. Fountaine ..... Indiana
W. P. Genovar ..... Florida
W. A. Gibb ..... Montana
*Thos. Granger ..... Missouri
†J. E. Grant ..... Kentucky
†L. F. Grant ..... Kentucky
Carroll C. Green ..... Texas
E. S. Gregory ..... Alabama
John R. Greening ..... Missouri
A. Norman Hardagay ..... Kentucky
*J. D. Herd ..... Kentucky
*W. T. Herndon ..... Kentucky
C. C. Hibbs ..... North Dakota
F. Lee Hill ..... Kentucky
Seaf E. Huffhines ..... Kentucky
O. B. Irvan ..... Kentucky
A. S. Kerley ..... Texas
*W. E. Lester ..... Kentucky
*R. A. Lindley ..... Texas
G. H. Lowe ..... Illinois
G. F. Lucas ..... Kentucky
†A. O. Lynch ..... Kentucky
E. H. Maggard ..... Kentucky
G. G. Maggard ..... Kentucky
†W. L. Main ..... Indiana
W. F. Martin ..... Mississippi
Miss J. A. Manvell ..... Mississippi
G. H. Means, Jr. ..... Kentucky
Paul C. Mitchell ..... Indiana
*J. J. Mullally ..... Maine
J. N. Murrell, Jr. ..... Kentucky
R. W. McDonald ..... Mississippi
*J. D. McMeekin ..... South Carolina
†H. T. Nichols ..... Kentucky
*Wm. O'Sullivan ..... Maine
Harry E. Ohme ..... Florida
*G. T. Parker ..... Kentucky
F. C. Parkey ..... Tennessee
*C. L. Peyton ..... Kentucky
T. W. Pennington ..... Kentucky
†W. F. Phillips ..... Kentucky
J. G. Pirie ..... Scotland
D. M. Pixley ..... Illinois
L. G. Ray ..... Kentucky
Charles Reese ..... Kentucky
G. A. Reichenberg ..... Kentucky
L. L. Rice ..... Indiana
Montrey E. Rice ..... Texas
J. E. Richardson ..... Kentucky
J. E. Robertson ..... Kentucky
C. A. Sanders ..... Kentucky
J. E. Seebold ..... Kentucky
Blant Shacklett ..... Oklahoma
Lucien D. Shause ..... Kentucky
Lewis G. Singleton ..... Kentucky
B. W. Stallard ..... Kentucky
W. V. Stallard ..... Kentucky
*Arthur Steely ..... Kentucky
*J. T. Stephenson ..... Kentucky
James Studds ..... Texas
M. E. Tate ..... Kentucky
R. A. Thomson ..... Kentucky
N. R. Thompson ..... Mississippi
H. B. Tileston, Jr. ..... Kentucky
†Jos. Tormey ..... Wisconsin
C. A. Ward ..... Texas
†T. J. Welsh ..... Kentucky
T. A. Wilkins ..... North Carolina
*G. D. Williams ..... Kentucky
G. L. Wilson ..... Mississippi
*H. B. Wolfe ..... Kentucky

*Short on time. †Short on time and did not receive diploma.

ROYAL COLLEGE OF DENTAL SURGEONS OF ONTARIO.

THE annual commencement exercises of the Royal College of Dental Surgeons of Ontario were held in Toronto, Ont., April 27, 1905.

The degree of Licentiate of Dental Surgery was conferred by Dr. H. R. Abbott, president of the board of directors, on the following graduates:

James M. Abbott
Geo. Arthur M. Adams
John Lorne Anderson
Walter Bonny
G. H. Bray
Wm. Bushnell
Donald Roy Callum
Wm. Hamlet Caverhill
W. J. Cameron
G. H. Cook
Percy T. Coupland
James Weldon Coram
Jas. F. D. Dillane
Samuel Eckel
Henry Edward Elliott
Lorne John Dale Fasken
Archibald Wm. Forbes
Ed. M. Fulton
William John Garland
Fred. W. Gordon
J. H. Gorman
John Ferguson Grant
Elmer James Hambly
John Roland Hand
Erle Heber Henry
E. A. Hill
Heber John Hodgins
Geo. Harold Holmes
Frank W. How
C. L. Huffman
Richard Wm. Hull
Chas. Jos. Fred. Jackson
Walter Thomas Jeffs
Herbert H. Kilpatrick
Harry Miles Kinsman
Hiram Horton Kirby
R. Melville Large
Wm. James Lea
John Beldon Lundy
Wm. Craven Macartney
Jas. Francis McDonald
Geo. Arthur McDonald
Clifford Chas. Nash
Howard A. Nesbitt
George C. Phillips
Howard Victor Pogue
Neil Smith
John Fraser Taylor
Samuel M. Thomas
Josiah A. Thompson
Arthur Malon Weldon
Wm. Collins Wickett
Hillary N. Wilkinson
Herbert Blake Ward
Albert Ed. Wark
James Malcolm Wilson
David Donald Wilson
Ed. Wm. Jos. Woods
Horace Wood
Everett Roy Zimmerman

UNIVERSITY OF CALIFORNIA, COLLEGE OF DENTISTRY.

THE annual commencement exercises of the University of California, College of Dentistry, were held in the Greek Theater, Berkeley, Cal., May 17, 1905.

The degree of Doctor of Dental Surgery was conferred by the president, Benjamin Ide Wheeler, Ph.D., on the following graduates:

Milton Elijah Arner	California	Isaac Saff Minor	California
Harry Phillips Beaser	California	James Sears Montague	California
Walter Marion Bullock	California	Roy Foley Morehead	California
John Francis Cowes	Hawaii	Joseph Rafael Neto	California
Norris Cecil Cummings	California	George Derby O'Connell	California
Frederick Arthur Curtis	California	Attilio Francis Pescia	California
Frank Henry Eidenmiller	California	Frederick Wallace Potter	California
Amos Otis Evans	California	Thomas Leslie Rogers	California
William Albert Flood	California	John Anthony Scannavino	California
Adolph A. W. Foerster	Germany	Andrew Mosley Spinks	California
Ferdinand Herbert Frenzel	California	Claude Stansbery	Washington
Albert Bates Howe	California	George Clarence Steinmiller	California
Emil Hermann Kaufman	California	Andrew Jackson Stevens	California
William Henry Kedian	California	Henry Fulton Sturdevant	Colorado
Joseph Benjamin Keogh	California	Homer Swain	California
William Walter Leslie	California	Ansgar Elias Syverson	South Africa
Harry Davis March	California	LeRoy Tufts	California
Carlos José Marizuya	Guatemala	Thomas Vaughn	California
Lewis Carson Marshall	California	Robert James Young	California
Joseph Henry Mazza	California	Charles Edgar Young	California

HOWARD UNIVERSITY, DENTAL DEPARTMENT.

THE annual commencement exercises of the Dental Department of Howard University were held in Convention Hall, Washington, D. C., Thursday, June 1, 1905.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Frank Bernard Badger
Frederic Pelham Barrier
George Morrison Cathrell
Wilbert Lawson Douglass
James Anthony Godfrey
Alfred Robinson
Oscar Marescaux Seaton
William Henry Sutherland
Roscoe C. Wormley

OMAHA DENTAL COLLEGE.

THE annual commencement exercises of the Omaha Dental College (Dental Department of Omaha University) were held May 1, 1905, in Omaha, Neb.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Scipha Bert Arthur
William Christopher Bentz
Guy Leo Birdall Brillhart
William Bowman Burgess
Carl Vaughn Campbell
Albert Alton Crandall
Charles Nelson Eddy
Homer Alonzo Foltz
Merrill Henry Garrison
Louis Eugene Gurney
Thomas George Hibbs
Oliver Larkin Jennette
Thomas William Johnson
Clyde De Witt Kenner
Herbert Eugene King
Frederick Christian Lage
Leo Blaine McClaran
Anna Laura McMullen
James Westly Novak
Hiram Channing Parker
Claude Walworth Percival
Samuel Carey Ralston
Hugh Adams Reed
Augustus Frederick Robson
Lorenzen Peter Ronne
William Frederick Schwenker
Clarence Spurgin
Czerrny James Paul Liszt Stockfeld
George Otis Sturdevant
Axel Theodore Tornholm
Harry Morgan Tweedy
Egbert Samuel White
William Washington Ward

UNIVERSITY OF MICHIGAN, COLLEGE OF DENTAL SURGERY.

THE annual commencement exercises of the College of Dental Surgery, University of Michigan, were held in Ann Arbor, Mich., Thursday, June 22, 1905.

An oration was delivered by Henry S. Pritchett, president of the Massachusetts Institute of Technology.

The degree of Doctor of Dental Science was conferred on Marcus Llewellyn Ward.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

James Owen Adams
Leonard Copeland Austin
Clayton Garfield Bailey
James Alfred Burrill
Leonard Burnham Chapin
William Frederick Dodsley
Henry Seth Edmonds
Raymond Newell Fisher
Russell George Gordanier
Arthur Charles Hamm
Bert H. Honeywell
Clare Addison Howland
Bertrand John Howlett
William Gordon Slaughter Letterman
Bert Courtney Le Vanseler
Robert McCann
William F. B. McDonald
Arthur Francis Marvin
Ralph Fern Merritt
Henry Bush Moore
John Walter Needles
Charles Bradish Newcomb
Glenn Scott Patterson
William Louis Rarden
George Clayton Richardson
Clifford Clark Robinson
Ray Lynn Sexton
Clayton Frank B. Stowell
Eugene Frederic Strom
George Franklin Terry
James Dean Terry
Edward George Weeks
George Conrad Weideman
Irving Lovette Wheeler
Albert Edward Wilson

HARVARD UNIVERSITY DENTAL SCHOOL.

THE annual commencement exercises of Harvard University Dental School were held at Sandees Theater, Cambridge, Mass.,Wednesday, June 28, 1905.

The degree of Doctor of Dental Medicine was conferred by the president, Chas. W. Eliot, on the following graduates:

Walter Childs Bazin
Robert Scott Catheron
Earle Clinton Cummings
Harold Leonard Emmons
John Arthur Furbush
George Stephen Smith Greenwell
Howard Robinson Greenwell
Albert Herder
George White Isles
Varaztad Hovhaness Kazanjian
Carl Kolb
Philip Amos Leavitt
Howard Mathers
Charles Whiting Mock
Blaine Wilcox Morgan
John William O'Connell
Joseph Francis O'Connor
Abner Beale Packard
Newell Oscar Parker
Walter Oscar Paul
Simon Vartan Pazeian
Walter Fairfield Provan
Charles Henry Reed
John Henry Russell
William Vernon Ryder
Otis Shaw Smith
Charles Edward Stevens
Lester Ashton Stone
Frank Stuhl
Harry Samuel White

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JUNE 1905.

June 6.

No. 791,456, to FRANK R. DENTON. Artificial tooth.

No. 791,563, to ROSCOE F. LUDWIG. Rubber dam holder.

No. 791,641, to ISAAC W. MCCLANAHAN. Tooth-crown.

No. 791,668, to FREDERICK H. APEL and STANLEY A. MERKLEY. Prophylactic dental appliance.

No. 791,859, to ELIAS D. BARNES. Dental separator and tooth-holder.

June 13.

No. 792,438, to WILLIAM W. MINCH. Dental matrix retainer.

June 20.

No. 792,618, to FINIS E. ROACH. Artificial denture.

No. 792,836, to BURT LOVELESS. Dental obtunder.

No. 792,871, to WILLIAM B. ALFORD and EDWIN P. ALFORD. Cuspidor.

June 27.

No. 793,099, to JULIUS B. SAPP. Syringe.

No. 793,134, to WILLIAM G. HUGHES. Cuspidor.

No. 793,233, to JOHN J. RYAN. Lamp-holding bracket for dental chairs.

No. 793,424, to LEVITT E. CUSTER. Electric oven.

THE

DENTAL COSMOS.

VOL. XLVII. SEPTEMBER 1905. No. 9.

ORIGINAL COMMUNICATIONS.

THE MECHANICAL TREATMENT OF CONGENITAL CLEFT PALATE.

By CALVIN S. CASE, M.D., D.D.S., Chicago, Ill.

(Read before Section VIII, Fourth International Dental Congress, St. Louis, Mo., August 30, 1904.)

AT the meeting of the National Dental Association in 1902, and at the Illinois State Dental Society of 1903, I presented descriptions of a new form of artificial palate. And now after a more extended opportunity, with a greater number and variety of cases to study the development of this principle and its possibilities, I am more convinced than ever that it represents a system that is both practical and scientific for the mechanical correction of every form of congenital cleft palate, and one, moreover, that is absolutely sure of affording means for the perfect correction of speech in these cases.

Some authors have made quite a distinction between an obturator and a velum, so that the profession has come to regard an obturator as any cleft-palate instrument which is composed of hard material, gold or vulcanite, and a velum as one composed of flexible rubber after the form of the Kingsley palates. Both are essentially for the correction of speech by restoring a lost or undeveloped portion of the natural palate by artificial means; correctly speaking, therefore, they are both artificial palates.

When Dr. Wm. Suersen proposed the insertion of a cleft-palate instrument which could be worn with comfort and, in conjunction with the muscles, enable the patient at will to close the connection between the oral and nasal cavities, he presented a scientific principle that is as true today as then, and one, moreover, that must be successfully attained to be of value to the wearer, whatever the form of the instrument or the method of its construction.

He called the instrument which he devised for this purpose an "obturator," because it was intended to close and prevent the passage of air, which is the vehicle of voice, from escaping into the nares.

Later, Dr. Norman W. Kingsley, who will always be regarded as one of the greatest geniuses of his day, realizing the difficulties of constructing and successfully applying the Suersen device, invented a flexible-rubber palate, with which you are all familiar. He named it an artificial velum, because its posterior

extension was intended to imitate the action of the natural velum, by bridging the cleft and restoring the palate to the possibilities of a normal organ of speech.

It doubtless has done more than any other device that has ever been invented to relieve the ills of this most unfortunate deformity, principally because it could be inserted and worn with comfort, even though quite imperfect in its adaptability to the parts, and though more or less inadequate in possibilities for the acquirement of perfect enunciation and tone. But Dr. Kingsley and others who adopted this method of practice, I believe, have always been convinced of its inefficiency when considered as a permanent appliance, if for no other reason than the early deterioration of flexible rubber when worn in the mouth, requiring that the palates be renewed about as often as once a year to keep them in the necessary form. This is not difficult for those who construct individual molds for each case, in which the palates can be easily vulcanized and mailed to any part of the country. But in a long experience of its use I have found that three-fourths of the patients soon tire of this *régime,* and either discard their palates altogether or get along in some way with what must be very poor apologies.

So that at best the most ardent admirers of the Kingsley velum regard it as only superior to a perfectly constructed obturator for the early stages of a completed operation.

Dr. R. Ottolengui, in discussing my paper at the National meeting, said: "The only advantage of a soft velum over an obturator seems to be that it enables a more rapid progress in the acquirement of speech, but later in life, perhaps at the time when the patient needs a new instrument—in any event speech having been perfected—it is usually preferable to make a hard-rubber appliance, which will be more permanent and more cleanly than one of soft rubber. Thus the obturator apparently comes into use after the patient has been educated to speak by means of the soft-rubber appliance, which should, in every sense of the word, be a velum."

Though Drs. Kingsley, Ottolengui, myself, and others have always advised the changing of vela for metal or hard-rubber instruments, the instances are rare when this has been done, principally because it involved another complete operation considerably differing from the first, with added fee, etc.

In some instances there has been an attempt to change the Kingsley vela for hard-rubber obturators made after the very ingenious method and form devised by Dr. Grant Molyneux; but, largely because the shape and conditions were so entirely different, with the consequent irritation to the sensitive tissues, the patients could not be induced to wear them, and insisted upon continuing with the original palates which gave them no discomfort and when new and perfectly fitted enabled them to speak with the most satisfying results.

Then the question arises: If the hard rubber or other so-called obturators are ultimately superior, why not make them in that way at first?

To say nothing of the extra irritation to exceedingly sensitive tissues which a hard rubber or metal appliance would at first produce, even if absolutely correct in form, those who have had considerable experience in the fitting of artificial palates know very well how difficult, and in most instances impossible, it is to make a *first* palate that does not require considerable change in form before it perfectly subserves the purpose of vocal articulation. Nor can this always be accomplished skilfully until the palate has been worn for some time, and the tissues allowed to become accustomed and adjusted to this foreign body in the mouth and throat.

Through a desire to take advantage of the benefits afforded by a soft-rubber appliance on the one hand, and a hard-rubber obturator on the other, and at the same time avoid the possibilities of the final inefficiency of the one and the difficulties in construction and adjustment presented by the other, has arisen the present artificial palate, which it is the object of this paper to present.

It essentially consists of a form of

palate which can first be made of soft rubber and possess all the advantages of the Kingsley velum, and then when the patient has become accustomed to it in its flexible state, and its present form is assured, by packing the same casts in which the soft rubber palates were vulcanized with another quality of rubber, a hard-rubber palate is produced which possesses all the advantages of a perfect obturator.

If made of soft rubber and vulcanized within specially constructed metal molds, as this system demands, the operation is a perfectly painless one, and the first palate can be worn without irritation or special inconvenience; after which, desired changes in its form, that are nearly always required to perfect the palate, can then be easily made by slightly enlarging or contracting the mold.

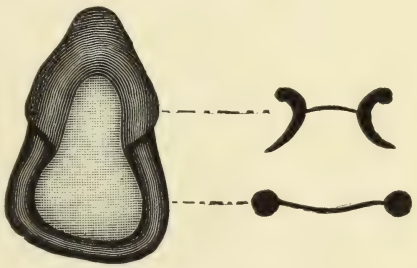
In my first paper I presented it as composed of soft rubber alone, not having had an opportunity to judge of its merits when made of hard rubber. Dr. Ottolengui, in opening the discussion, said: "I had always thought until to-night that it would be necessary for those who treat these cases mechanically to decide between a hard-rubber obturator and a soft-rubber velum, but Dr. Case has brought us a new appliance. He states that it differs essentially from the Kingsley velum, and it certainly does, not only in form but in action and every feature. Of course, it is not a hard-rubber obturator, but I consider it an obturator rather than a velum."

Those who are familiar with the Kingsley palates, which I am pleased to say I have used with great satisfaction in my practice for over twenty years, will remember that the veil or posterior portion of the palate is sustained by extending the central thickened portion into it, and from this point it is gradually flattened to a comparatively thin edge, where it is more or less curved in conformity to the pharyngeal wall, against which it is intended to rest during the contraction of the pharyngeal and palatal muscles.

In this particular it is quite different in form from the palate I am about to describe, in that with the latter all the central portion of the palate is thin, while the edge of the veil is thick, in the form of a solid roll about one-fifth of an inch in diameter, or preferably triangular, with rounded corners, so that its outer flattened surfaces exactly and firmly fit the pharyngeal walls *when the muscles are in a contracted state.*

Fig. 1 represents the lingual view of the artificial palate, with transverse sections. Figs. 2 and 3 show the palate in position.

Fig. 1.



In extensive clefts the borders of the veil extend forward along the lateral walls of the pharynx and posterior nares, and becoming thinner, form the borders of the nasal extensions which rest upon the floor of the nares.

When the cleft does not extend into the hard palate, the veil is shaped in a similar manner, but with the nasal portion abridged to meet the requirements of the case.

Where the cleft extends into the hard parts, the body of the palate which covers the borders of the cleft and forms the lateral wings on the roof of the mouth should not extend back of the attachments of the bifurcated velum palati, nor in any way interfere with the free action of the muscles; neither should it extend upon the roof of the mouth any farther than is necessary to give a firm seating for the palate. This portion should be about as thick as an ordinary rubber plate, being thinned along its oral borders and thickened to form the nasal borders.

There are a number of important advantages in this form of palate, even when made of flexible rubber and used for the purposes of a velum:

First. The early deterioration of the rubber, causing the curling up of thin edges of the veil, is entirely prevented. When this occurs, as it frequently does with ordinary vela, the vocal usefulness of the palate is impaired—if not destroyed—in proportion as it permits the escape of air at the curled-up portion of the border.

FIG. 2.

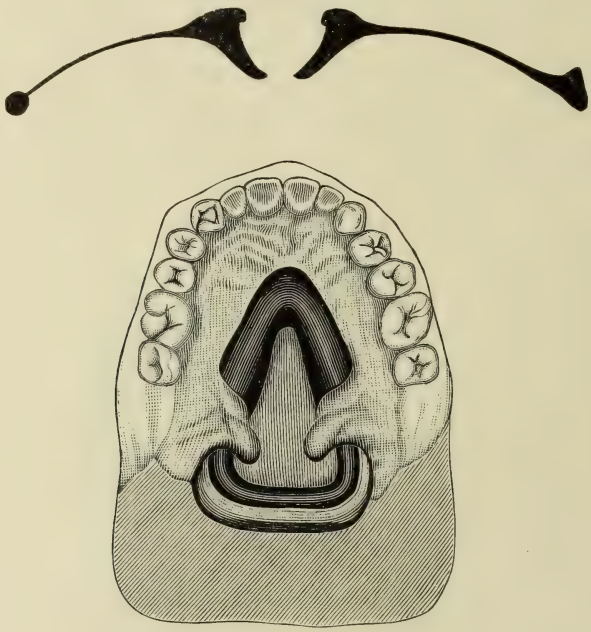
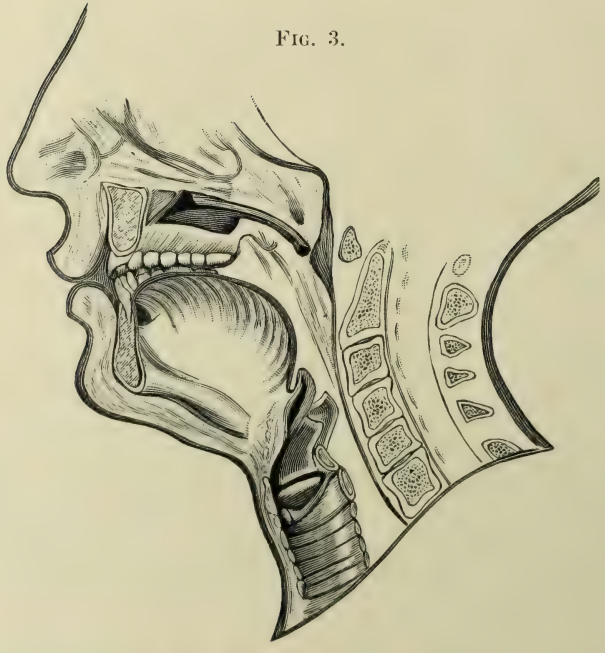


FIG. 3.



Second. The heavy border of the veil

is sufficiently yielding and flexible to be worn with comfort if properly fitted, and it also presents sufficient stability and breadth of surface to permit firm contact of the pharyngeal muscles in closing the naso-pharyngeal opening.

Third. In more or less extensive clefts the thin central portion extending forward into the body of the palate permits a resilient yielding of the lateral portions of the body, which frequently allows one to spring it into place with sufficient grasp of the irregular borders, along which it should accurately fit, to hold it in position without other aid. Whenever this can be accomplished with the soft palate, it will readily be continued when it becomes hard.

In taking an impression for the construction of this palate where the cleft is extensive or even extending somewhat into the hard palate, it is my object to obtain a perfect model of that portion of the roof of the mouth over which I wish the palatal portion of the plate to extend, and along the borders of the cleft forward of the pendent portions of the velum palati, extending somewhat upon the floor of the nares and representing as perfectly as possible the nasal borders of the cleft and lateral surfaces of the posterior nares. (See Figs. 11 and 12.)

These surfaces, a part of which lie above the pendent and unstable tissues of the velum palati, are frequently susceptible of being perfectly reproduced in the model of a plaster impression. It will usually be found in a typical case that the posterior nasal openings are laterally constricted, from which point the nasal fossæ widen to form the floor of the nares. By obtaining a perfect impression of these somewhat unyielding surfaces, which otherwise, on account of their position, would be very difficult to reproduce, the anterior borders of the artificial veil can be perfectly fitted to them as they merge into the nasal borders of the body.

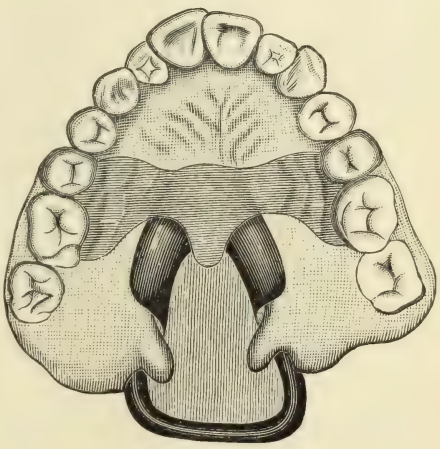
I lay particular stress upon this portion of the operation because I have found it important, not only as a great aid to the proper action of the pharyngeal muscles, but in clefts of considerable extent the overhanging nasal borders of the artificial palate can be easily sprung into place, and when fitted perfectly patients soon learn to place and sustain the palate without the aid of a supporting plate.

I would advise, however, that the supporting plate be always made, to enable patients to more readily adjust and sustain the palates until they have learned to wholly do without it.

When no artificial teeth are required, or when, if required, a bridge denture is practicable, the supporting plate should be made to cover as small an area of the roof of the mouth as is consistent with the demand for strength. I rarely extend it forward of the second bicuspid, leaving as much of the anterior palatal surface exposed as possible, which I believe materially aids in acquiring perfect enunciation.

Fig. 4, which is made from the model of an impression of the mouth with the

Fig. 4.



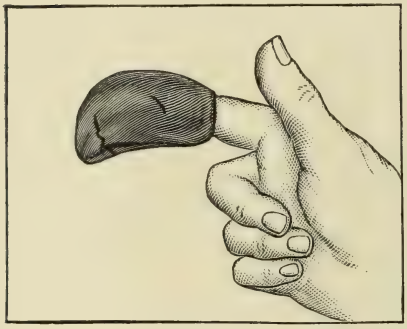
apparatus in place, shows the form of the supporting plate I usually make.

Preparatory to taking the impression for an artificial palate, I study well the cleft and surrounding tissues to determine the character and extent of the impression. For all clefts that involve the hard palate, an accurate plaster impression of the parts outlined is not more difficult than most impressions for partial dentures.

There are two ways of taking these impressions: One by forming a base of modeling compound upon which to lay the plaster, and the other by using plaster alone.

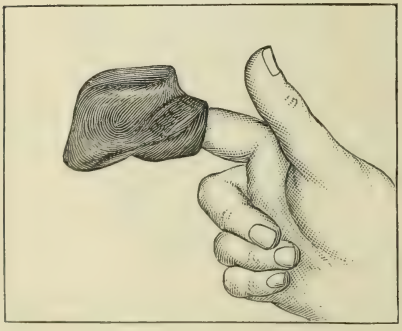
For the first the compound is wrapped around the forefinger (Fig. 5), and

Fig. 5.



pressed gently to place. Removing, softening, and perhaps slightly reshaping and cutting away surplus, this is repeated several times, with the view of finally obtaining a modeling-compound

Fig. 6.

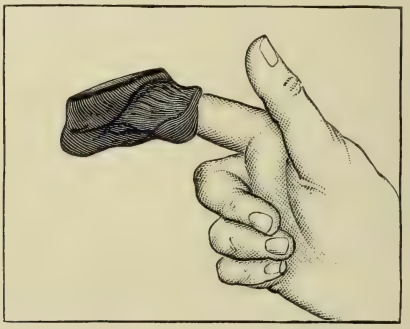


impression that will not displace the soft posterior borders, and that will perfectly support the plaster for the final impression. (See Fig. 6.)

The palatal surface is then roughened so the plaster will cling to it, and all that portion of the compound which extends above the nearest approaching borders of the cleft is cut away and the cut surface smoothed and oiled. (See Fig. 7.)

This, when carried to place with the plaster in position, need cause no fear of its easy removal, even though an excess of plaster be used—providing it does not come forward of the alveolar ridge in ex-

Fig. 7.



tensive double clefts—as all that portion which extends above the border of the cleft forming the impression of the nasal fossæ will readily break from the smooth, oiled surface of the compound when the

Fig. 8.



impression is removed, it being otherwise unattached to the lower parts, as the compound completely bridges the cleft from its nearest approaching borders. The nasal section can then be teased back toward the more open portion of the cleft, and allowed to fall on a mouth-mirror, from which it is replaced upon the im-

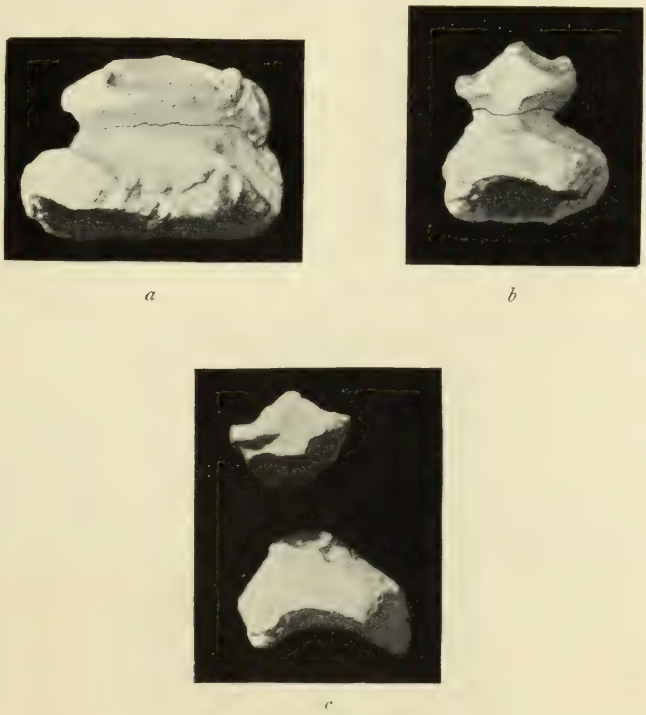
pression. (See Fig. 8.) Fig. 9 shows different views of a plaster impression taken in this way.

As a rule, I prefer plaster alone, dividing it as above in sections at the borders of the cleft. Fig. 10 shows different views of an impression of an extensive cleft taken entirely with plaster. The first section is passed freely into the nasal

In filling and trimming the models from these impressions, nearly all that portion back of the attachments of the soft palate is cut away, and the nasal portion open and freely exposed to the extreme nasal borders, produced by the impression.

This is done to facilitate shaping the modeling-compound model of the palate,

FIG. 9.



a *b* *c*

cavity with a spatula, stopping it abruptly at the nearest approaching borders of the cleft. The under surface is then lubricated with a solution of white vaselin, and the first part of the second section is delicately laid on with the spatula, so as not to lift or dislodge the upper section. The plaster is spread out over the roof of the mouth with a spatula, and when partially hard is strengthened for removal with fresh plaster introduced in a flat impression tray. The impression does not need to extend even to the gingival borders of the teeth.

and its ready removal and replacing during the process of repeated trials in the mouth.

Fig. 11 shows lingual aspect of the finished model. The nasal aspect would look very similar.

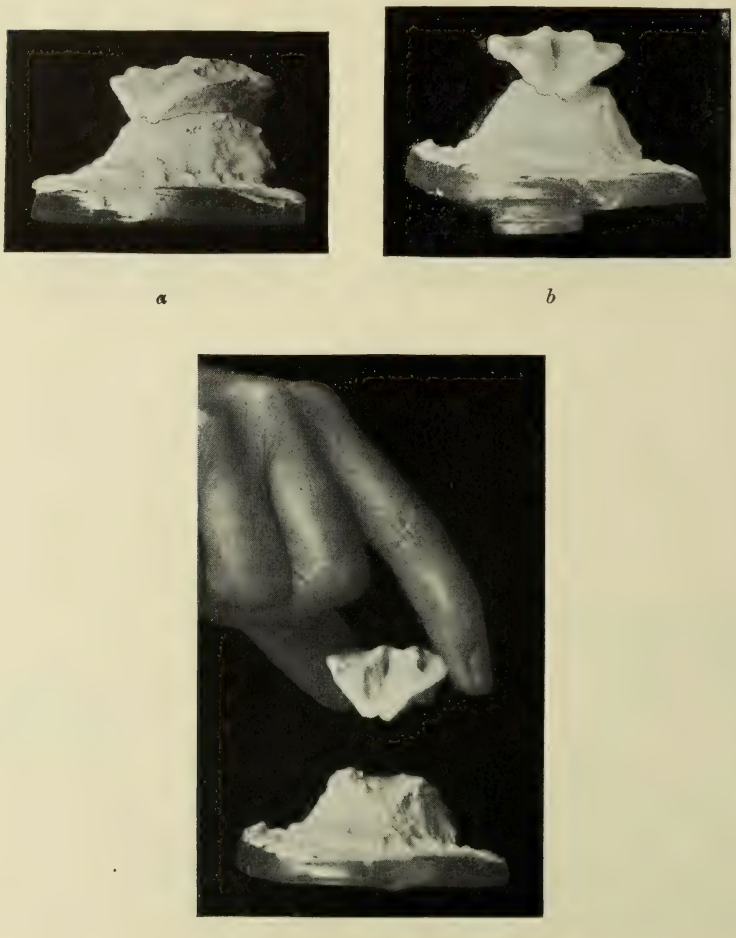
The model of the body of the palate, as shown in Fig. 12, is formed first and then inserted in the mouth for trial, etc. At this time the lateral nasal extensions of the palate model should be abridged to facilitate introduction. They can be added at the time of investment, and, if desired, still further extended by scraping the metal molds.

The position for the border surface of the veil is determined with a loop of small soft copper wire No. 20, the ends of which pass into thin tubes about half an inch long, imbedded in the upper surface of the palate model. (See Fig. 13.)

The loop is drawn out to about the proper size and shape, and the palate model inserted into the mouth for correction, etc., until the wire is seen to rest along a zone of the pharyngeal walls that is best adapted to unite in their muscular action with the artificial veil for the ultimate closure of the naso-pharyngeal opening.

The path of this pharyngeal zone, which practically should extend from the lateral extension of the nasal borders on each side back to a line immediately in front of or slightly above the greatest contracted extension of the superior pharyngeal muscle, is carefully chosen to avoid impinging upon the Eustachian opening, and to obtain the most active possibilities of the muscles. The surrounding muscles can be made to contract by a slight titillation of the surface, and, what is of the greatest advantage, the pharyngeal walls above and below the wire can be readily seen through the open loop, and the action of the muscles studied.

Fig. 10.



a *b*

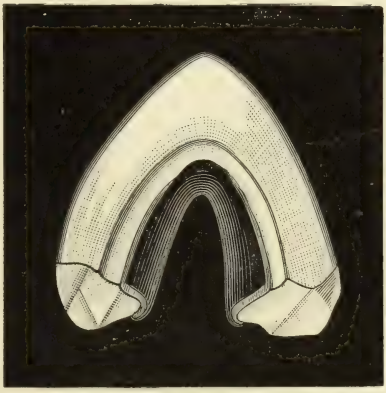
c

As the loop turns forward to pass beneath the Eustachian opening, the pharyngeal surfaces will often be found

Fig. 11.



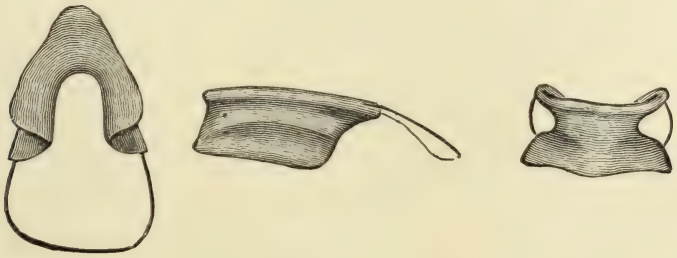
Fig. 12.



corrugated and thrown into irregular folds, so that in finding the smoother path across these ridges, to prevent the escape of air at the border of the veil through these sulci, it may be found desirable to raise or lower the wire upon one side more than the other. Forward of this it soon comes in contact with the upper surfaces of the palatal muscles, as it enters the posterior nares.

After fitting the wire to mark the desired outlines of the veil, the roll of compound which is to form the model of the border, as shown in Fig. 14, may be attached to the loop, following the outlines of its peripheral surface. This is placed in the mouth warm, and the patient told to swallow, which being repeated several times will produce a perfect impression

Fig. 13.



a *b* *c*

Fig. 14.



on its outer border of the desired zone when the muscles are contracted.*

The object of the veil or pharyngeal portion, as Suersen pointed out at the birth of scientifically constructed artificial palates, is to give the greatest possible aid to the muscles, principally the superior constrictor of the pharynx, to form a complete closure of the nasal passage in producing the enunciatory parts of the consonants, and then to be immediately followed or preceded by the largest possible opening when the muscles drop back to take a position to form resonating or open tones.

It will be seen by this that the relative position of the border, or contact surface of the veil, should be only that which is consistent with the possibilities of the muscles to completely reach and close the space, in order that resonance or the power of freely throwing the tone into the sounding-chamber of our vocal organs—which is quite as important to perfect speech as distinct enunciation—may not be obstructed.

I can see no reason, furthermore, why the pharyngeal contact surface of the palate should be any wider than necessary to enable stability of muscular contact, as seems to be presented by the Molyneux pattern, nor do I see that the central portion of the palate needs to be thicker than is sufficient to stop the air, which is the vehicle of voice.

If the diaphragm be a thin plate of rubber or gold, valuable resonating and nasal breathing space will not be obstructed.

I at first named this palate the "velum obturator," because it stands for both, but as Dr. Ottolengui has said, it is more of an obturator than a velum, and yet it is one which, if made of soft rubber vulcanized within metal molds and properly constructed according to the method and principles I have outlined, presents to the patient and the operator all the advantages of a soft-rubber velum.

The principal advantage in this system of preceding the operation with a soft palate is not that it can be worn with greater comfort from the start, nor that it enables the patient to more readily acquire perfect speech—though these are important—but that it admits of more readily determining the slight variations in its form that may be necessary and possible to alter by changing the molds in which it is vulcanized, until you have reached a form that is exactly suited to the demands of the surrounding tissues for the acquirement of perfect enunciation, resonance, and tone. When this has been accomplished, the palate is easily changed from a soft to a hard-rubber obturator by simply packing the same molds with hard vulcanite instead of soft.

The fact that this change can be made without subjecting the patient or operator to another complete operation, and also that the hard-rubber palate is the same shape as the soft one, which the patient has become accustomed to, are features of incalculable importance.

Again, this change can be made gradually by packing a portion of the mold with hard and the balance with soft rubber.

When I am ready to change it to an obturator, it is my custom to make the first ones with the body, or naso-palatal portion, of hard rubber and the veil of soft. This will not subject the sensitive tissues to a too sudden change.

A favorite method will be to make the thin central portion of gold plate rolled hard and as thin as No. 38. The gold plate is cut the proper size to permit its edges extending partly into the thick border of the veil. This is then laid in place in the mold, and the rubber packed as before.

If the border of the veil is made of soft rubber and the central portion of gold, I have no doubt the palate will last for years without harmful deterioration. This would permit a slight elastic movement of the veil that is always desirable.

I here present a variety of palates of practical cases [exhibiting], made in the different ways I have described, which will give you a far better idea of its form than has been possible with the illustrations.

* Dr. Grant Molyneux was the first to use a wire loop to obtain plaster impressions of pharyngeal walls.

A BIOGRAPHICAL REVIEW OF THE CAREERS OF HAYDEN AND HARRIS.

By BURTON LEE THORPE, M.D., D.D.S., St. Louis, Mo.,

DEAN, PROFESSOR OF OPERATIVE DENTISTRY AND DENTAL HISTORY, BARNES DENTAL COLLEGE, DENTAL DEPARTMENT BARNES UNIVERSITY.

(Presented to Section IX, Fourth International Dental Congress, St. Louis, Mo., September 2, 1904.)

OF the many able men who have contributed to develop the dental profession, two men stand out preeminent as the progenitors of dental science.

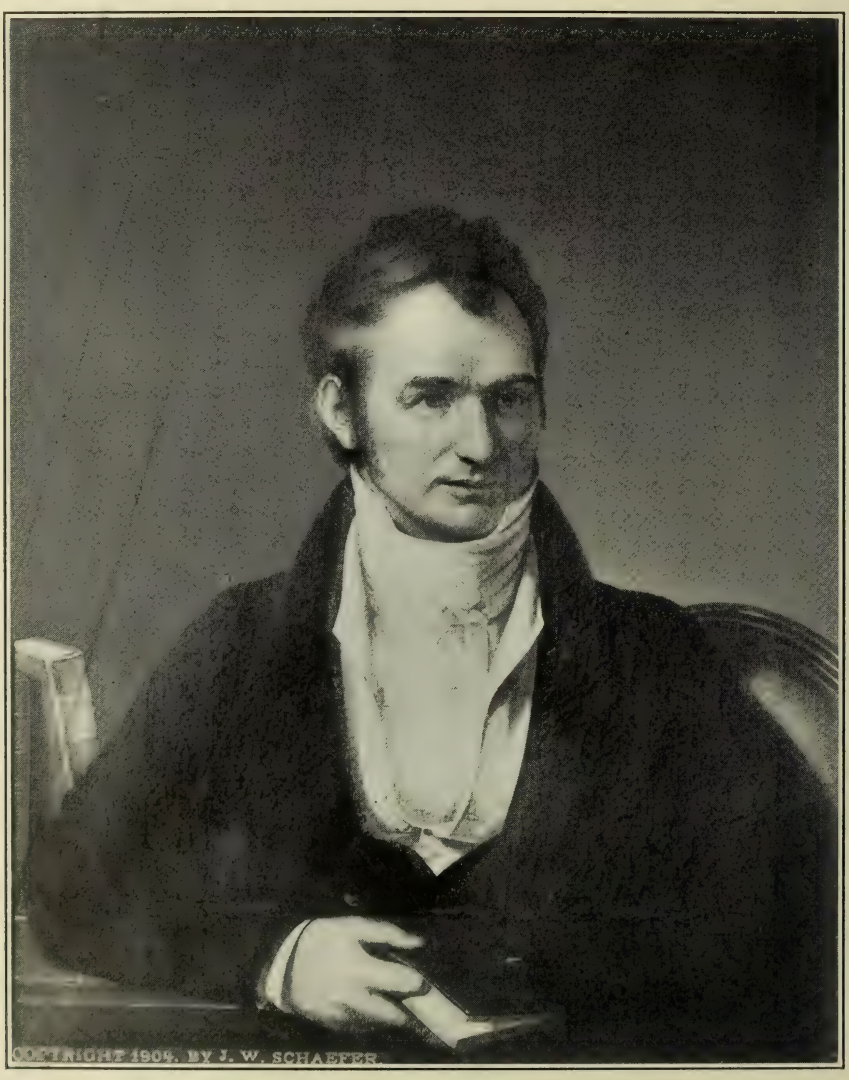
Both were men of rare native talent and genius, possessing an inexhaustible amount of energy, enthusiasm, and resourcefulness, which, when combined, united dental surgery to science and raised it to the worth and respectability of a profession. As authors, teacher-practitioners, and organizers of the first dental college, the first dental journal, and the first dental society, their names will ever illumine the pages of dental history as the leading spirits in making dentistry rank with other learned professions. To them, Longfellow's words, "Great men stand like solitary towers in the City of God," are indeed applicable.

HORACE H. HAYDEN, M.D., D.D.S.

Horace H. Hayden was born October 13, 1769, at Windsor, Conn., of honorable and Christian parentage. He was not born of obscure or poor parents, as stated by previous biographers. His ancestor, William Hayden of Connecticut (1630), won special mention for gallantry in the official report of his captain, John Mason, whose life he saved in the Pequot War of 1637. He settled in 1642 at Windsor, Conn., where he bought land, and also received land from the colony of Connecticut for his military services in the Pequot War. That land the family still owns, having held it now for 262 years. William Hayden's eldest son Daniel was a lieutenant in the Colonial service and a member of the General Court. His commission as lieutenant is extant. Lieutenant Daniel had also an elder son Daniel, who was likewise a member of the General Court of Connecticut. His eldest son, the third Daniel, was also a lieutenant in the French and Indian War, and for his day a rich man. The house he built and lived in still stands at Hayden Station, Conn., having been erected in 1740. This Lieutenant Daniel the third had as his eldest son Thomas Hayden, father of Dr. Horace H. Hayden the subject of this sketch. Thomas Hayden was an architect and builder, and served seven years in the Revolutionary War, as sergeant at the Lexington Alarm, 1775, and as sergeant-major, second lieutenant, first lieutenant, and adjutant, his service extending from 1775 to 1778 and from 1780 to 1783. When the Revolutionary War was ended Lieutenant Thomas Hayden had lost much, but still held his land and business.

It was from his father that Dr. Hayden learned the business of architect and builder. He had an honored ancestry from his mother, who was Abigail Parsons, a descendant of one of the brainiest families of New England. Born 1769, he was a boy during the Revolution, when, all the men being in the army, he and his mother harvested the crops and attended to the farm. Every ancestor he had in this country was a member of the Christian Church. Rev. John Warham, the first clergyman in New England and an ancestor of the Edwards, Burrs, and Parsons families, was also his ancestor, and as his mother and father were cousins the hereditary gifts of both lines united in him to some extent.

During his boyhood he exhibited a remarkable liking for natural history, often surprising his friends by his ingenuity and success in discovering objects of interest while rambling in the woods. At the age of ten he began the study of ancient languages, in which he became quite proficient. At the age of fourteen he worked his passage as a cabin boy on a brig to the West Indies, making two trips. After this he returned to school, to his books, and studies of nature, until he reached the age of sixteen, when he learned the trade of carpenter, and later became an architect.



HORACE H. HAYDEN, M.D., D.D.S.

Young Hayden was studiously inclined and whatever he undertook he worked at with a will. With characteristic ardor he diligently applied his mind to his new employment, reading such books on architecture, modern and ancient, as he could procure. He left many writings and

drawings as evidence of his knowledge and skill in this art.

At the age of twenty-one he again sailed for the West Indies, seeking employment in his business, and located at Pointe à Pitre, Guadeloupe; but after a brief stay, an attack of periodic fever compelled his return to his native land, where he remained until the following year, when he returned to the West Indies, but was again forced by the pestilence to return to Connecticut.

For several years he continued to follow his vocation as architect. At the age of twenty-four he left his native home and went to New York, remaining there during the spring and summer of 1792. Meeting with little success he returned to Connecticut and taught school near Hartford during the winter. Returning to New York he called on Mr. John Greenwood, dentist, for professional service. He greatly admired Greenwood's skill and, while under treatment, concluded to adopt that calling and to devote his time and energy to dental surgery. He immediately procured from Greenwood the few books and essays on the science at that time accessible—the best being the work of John Hunter. Leaving New York, he traveled to Baltimore, arriving there in 1800 without friends or fortune and with but an imperfect acquaintance with his new calling, but possessing plenty of native ability and imbued with energy and ambition to excel in his art. He rented a room in a frame house on the corner of Fayette and Charles streets, and announced to the public that his services were at their command. His natural earnestness and aptitude quickly attracted attention and he was soon actively engaged. He used to teach a class in dentistry, and thus began the first steps toward the college which Harris and he evolved from their work. He persuaded his brothers, Anson B. Hayden of Savannah, Ga., and Dr. Chester Hayden of Windsor, Conn., to study dentistry, and both became almost as eminent as he in the profession, though neither of them engaged in other lines of study.

Horace H. Hayden was licensed to practice dentistry in Maryland by an examining board created under an act of Assembly for the State of Maryland in 1789. The board was not, strictly speaking, a dental board, but created under an act regulating the practice of medicine and surgery.

To better perfect himself in his specialty he studied anatomy and medicine, acquiring much knowledge in these sciences and thereby gaining the respect and goodwill of the medical profession, whose confidence in him was shown in later years, when, without solicitation, the honorary degree of Doctor of Medicine was conferred on him by both the Jefferson College of Medicine of Philadelphia and the University of Maryland, in 1837.

When the British attacked North Point, Maryland, in 1814, Hayden enlisted as sergeant in Captain Warner's company of militia and served through the action, when, medical men being in demand, General Samuel Smith, knowing his skill in surgery, ordered him to the hospital as assistant surgeon, where he cared for the wounded until no longer needed. He came of a martial family, every Hayden ancestor having been a soldier.

Hayden rose rapidly in public confidence. He became associated with the most celebrated physicians and medical teachers in Baltimore and his opinions were listened to with respect and his suggestions frequently adopted. He was the first to give the profession caste in Baltimore. In 1825 he accepted an invitation to deliver a course of lectures in dental surgery to the medical class of the University of Maryland, an honor never before conferred upon any practitioner of dentistry in the United States. He contributed many essays on dentistry and medicine to the medical journals.

He delved into physiological and pathological research, making new discoveries, especially investigating the use and functions of the thyroid, salivary, lacrymal, and other glands of the human system, thus showing his acuteness of mind and experimental abilities. Having attained personal success and secured a profes-

sional standing he was anxious to improve the standing of his profession in general. He first advocated a union of dental practitioners into an association for mutual improvement, in 1817, but this was not effected until August 18, 1840, when in New York city assembled L. S. Parmly, Elisha Baker, Eleazar Parmly, Patrick Houston, Enoch Noyes, Vernon Cuyler, John Lovejoy, Chapin A. Harris, Jehiel Parmly, Joseph N. Foster, A. Woodruff Brown, C. O. Baker, J. Smith Dodge, and Solyman Brown, who actively aided him in founding the American Society of Dental Surgeons, and he was chosen its first president, continuing in that office four years, until the date of his death.

At the birth of this society he remarked that the formation of a national society of dentists had long been a favorite project with him and that he had not been alone in this desire. Many years ago he had consulted the elder Hudson of Philadelphia, who was favorably inclined to such an association. On a visit to Boston and Eastern cities he consulted his professional brethren and found them ready to co-operate in any practicable scheme to elevate the profession. He said that forty-three years ago the name of dentist was a reproach and a byword, and that he had resolved to improve and exalt the profession so that it was not a disgrace to be called a dentist. From that time he had seen the science assuming more importance in the public eye—men of learning, worth, and genius being added to the ranks of its professors from year to year.

"At the present period," continued the speaker, "renewed efforts are making in England, France, and Scotland to place our profession on still higher ground than it has yet attained; and shall we of these United States of America remain inactive in this grand endeavor? If, like the Jews, we are scattered and despised, may we not, like that persecuted people, at least hope for a day of restoration to our promised land? There are indeed many obstacles still to overcome!

"A new race of Canaanites must be expelled from our borders. Many errors must be exploded and much ignorance must be dispelled before the light of truth will beam clearly upon our path; but with diligence, zeal, and perseverance we are certain of ultimate success.

"Let us, therefore, go forward in the good cause, unintimidated by the skepticism of the faithless, the fears of the timid, or the apathy of the selfish. If there are some who prefer to plod onward in the path of private enterprise, let us unite our efforts in one great social endeavor to elevate our profession from the degraded condition to which it has sunk, and in which it must ever remain until the high-minded and well-educated among practitioners shall unitedly arise and shake themselves from the dust."

At the next meeting of the society, in 1841, he was instrumental in organizing, with the aid of his *confrères,* the *American Journal of Dental Science,* the first dental journal ever published.

With the aid of his friends and colaborers, Drs. Chapin A. Harris, Thomas E. Bond, and Willis A. Baxley, he formulated and founded in 1839 the first institution dedicated to special dental education in the world—the Baltimore College of Dental Surgery—of which he was, at the age of seventy years, the first president and first professor of principles of dental science and later professor of dental physiology and pathology, serving in that capacity until his death. The establishment of this college met with bitter opposition from many sources, and it was predicted by many that its success would be short-lived, but the zeal and conscientious efforts of Hayden and Harris made it the success they had hoped for. Long before 1841 Hayden said that "mechanical and operative dentistry" was "not, in strictness, the indispensable requisite qualification of a dental surgeon." He believed that the dentist to be qualified in his profession should be thoroughly educated in the science of medicine.

As a token of professional and personal merit he was created an honorary member of the Virginia Society of Surgeon Dentists, October 11, 1842.

February 11, 1842, Hayden was

granted a patent, which has been entirely overlooked by his early biographers, but which he atoned for in his later years; at the time of its issuance it was not considered unprofessional. His claim was "preventing caries of the human teeth, and the exclusive privilege of using and rendering the empyreumatic oil (tar or balsam) and acid obtained by distillation of wood, which oil or acid, when properly modified, proportioned, and applied, is used for the purpose of counteracting decay in human teeth, and the diseases consequent thereto, and to the human mouth." For this remedy Hayden claimed "an antiseptic property which counteracts caries, allays pain and irritability of the vessels of the teeth and mouth, lessens morbid sensibilities, and arouses and restores a healthy action."

Besides being a pioneer dentist, Dr. Hayden was a pioneer geologist. All through his career he was constantly examining mineral peculiarities, the result of that love for nature which was developed in his early youth when living on the banks of the Connecticut river. He was far ahead of his age in his scientific discoveries. There were then very few geologists in the United States. He collected a valuable cabinet of American minerals which in 1850 became the basis of the complete collection of Roanoke College, Virginia. So limited was the literature of geological science in English that he was compelled to master the French language to be able to read the best books on geology, from which he made many translations.

In 1821 he published an interesting work of 400 pages entitled "Geological Essays," the first general work on geology printed in the United States, and dedicated to his personal friend, Judge Thomas Cooper of Pennsylvania. He discovered a new mineral which was named Haydenite in his honor.

He was a botanist of no mean attainment, and he wrote on silkworm culture, etc. He was also a great sportsman; with gun and rod he excelled.

He married, February 23, 1805, at Baltimore, Md., Miss Maria Antoinette Robinson, daughter of Lieutenant Daniel Robinson of Baltimore, a United States revenue officer who had served in the Pennsylvania navy during the Revolution as lieutenant and quartermaster, and had succeeded John Dickinson as a member of the finance committee of Delaware in 1777. His children were Eliza Lucretia Hayden, Mandel Mozart Hayden, M.D., D.D.S., Edwin Parsons Hayden, lawyer; Horace William Hayden, merchant, and two others who died in infancy.

Dr. H. H. Hayden died Friday, January 26, 1844, at Baltimore, Md., aged 75 years, and was buried in Greenwood Cemetery, Baltimore, where his remains still lie in the family vault. Forty-four years of his life were spent in the active practice of his profession. Hayden had a prophet-like mind that foresaw the result of great enterprises. His keen intellect and foresight has made him the hero of our profession. To his last breath he spoke with love and praise of his students and the profession he did so much to advance and improve. He was a diligent student, a deep and independent thinker, eminent as a scientist in Europe and America, and an excellent teacher for fifty years, far in advance of his day. He was a God-fearing and truly scientific man, loving knowledge for its own sake, and was an honor to the profession that honors him. Time may erase his fame as practitioner, author, and scientist, but his name will ever live as "father of the American Society of Dental Surgeons."

CHAPIN A. HARRIS, A.M., M.D., D.D.S.

Chapin A. Harris was born at Pompey, Onondaga co., New York, May 6, 1806. His ancestors were of English origin, of rank and position, being a branch of the Harris family in England now represented by the Earl of Malmesbury. Captain Joshua Harris, who fought bravely under Stark at Bunker Hill, was his granduncle.

His grandfather, James Harris, who was killed in a skirmish during the Revolutionary War, was a native of England, as was his father, John Harris, born December 30, 1773, who married Novem-

ber 25, 1791, Elizabeth Brundage. They came to America and to them were born

man; John, a physician and dentist, and Chapin Aaron.



Chapin A. Harris, A.M., M.D., D.D.S.

two daughters—Amanda and Eliza—and three sons—James, who became a clergy-

About the age of seventeen young Harris moved to Madison, Ohio, at which

place his brothers James and John had previously located, and where John was practicing medicine, and he entered his office as a student about 1824.

After pursuing the course of study prescribed by the law of the state he applied to the Board of Medical Censors, who examined and licensed him to practice medicine and surgery. He commenced the practice of this profession in Greenfield, Highland Co., Ohio, where he continued for some years, when his attention was called to the possibilities of dentistry, by his brother John, who was well skilled in medical theory and practice before he engaged in dentistry in 1827. Chapin A. Harris and his friend James Taylor, later organizer of the Ohio College of Dental Surgery, were both students of medicine and dentistry under the tutelage of John Harris.

Chapin began the practice of dental surgery in Greenfield, Ohio, in 1828 by extracting, cleaning teeth, and inserting a few fillings. Not satisfied with the meager knowledge he possessed, he secured the books of Delabarre, Fox, Hunter, and other recognized authorities, and soon acquired a thorough knowledge of the profession in which he afterward became so eminent. He remained in Greenfield about a year and then moved to Bloomfield, Ohio, where he combined the practice of dentistry, medicine, and surgery for two or three years. Leaving that place, he traveled through the South and Southwest, visiting the larger cities as an itinerant. Wherever he went, by his good work the public estimation of the profession was elevated and his own reputation established.

Tiring of travel, he located at Fredericksburg, Virginia, where he devoted his time exclusively to the practice of dental surgery, his success being such that he entirely abandoned the practice of general medicine and surgery, but continued the study of medicine. In 1835 he located permanently at Baltimore, which offered many advantages for practice, and announced his readiness to practice his profession in all its branches. From that time until 1837 he employed a large portion of his leisure time in contributing to the pages of medical and periodical literature. In 1838, feeling his contributions were not producing the best results, he resolved that his writings should take a more compact and permanent character. This resolve induced him to prepare and publish his first book, entitled "The Dental Art: A Practical Treatise on Dental Surgery," which was issued in Baltimore in 1839 and dedicated to his medical friend Dr. Thomas E. Bond. This book consisted of 385 pages, illustrated by three lithographic plates. A second edition was issued by the firm of Lindsay & Blakiston, Philadelphia, in 1845, under the title of "Principles and Practice of Dental Surgery." This was a volume of 600 pages, containing sixty-nine wood engravings. Other editions were issued in 1847, 1850, 1852, 1855, 1858, 1863, 1866, 1871, 1885, 1889, 1898. During all these years many thousands of copies of the book have been sold, it being in all probability the most poular dental work published before or since that period. All the later editions have been edited by Dr. Ferdinand J. S. Gorgas, who has revised the book for each edition, except the tenth edition, which was edited by Dr. Philip H. Austen. His next literary effort was Harris' "Dictionary of Dental Science, a Dictionary of Dental Science, Biography, Bibliography, and Medical Terminology," published by Lindsay & Blakiston in 1849; other editions followed in 1854, 1877, 1891, 1898. The later editions of this work have also been edited by Dr. Gorgas, and it has had, considering its special character, a large sale throughout the English-speaking world.

Harris remodeled in 1846, with an introduction and numerous additions, Joseph Fox's "Diseases of the Human Teeth, Their Natural History and Functions, with Mode of Applying Artificial Teeth, etc." He also translated from the French the works of Delabarre, Lefoulon, Duval, Desirabode, and Jourdain, all republished in the *American Journal of Dental Science*. Dr. Harris was an untiring worker, and during the winter of 1838 he spent a month professionally at Littleton, N. C., where, one of his

old friends writes me, he did over four thousand dollars' worth of dental work in an office room 12 by 16 feet. He had no dental chair or head-rest, but sat in a chair and put his foot on a stool, the patients sitting on the floor, resting the head on his knee. He would work hard all day operating and write on the manuscript of his book, "Dental Art," until one or two o'clock in the morning. He was a laborious student and followed this practice of writing far into the morning after days of ceaseless labor and fatigue, to the end of his life.

Feeling the need of some receptacle for treasuring the experience of the profession and its current literature, he visited New York and urged upon a few professional friends the propriety of establishing a periodical devoted especially to the interests of the dental profession.

His plan was readily embraced by a few progressive men, who promptly called a meeting composed of some of the foremost of the profession in New York, some of whom subscribed one hundred dollars and others lesser amounts toward the expense of one year's publication of a monthly journal to be known as the *American Journal of Dental Science.* The first issue appeared June 1839, published at Baltimore, under the direction of a publishing committee consisting of E. Parmly, E. Baker, and Solyman Brown, with Chapin A. Harris and Eleazar Parmly as joint editors. This journal consisted of forty-eight pages, twenty-four of which were to be devoted to the publication of standard works on dental theory and practice. Among them were the treatises of John Hunter, Leonard Koecker, Baume, Gariot J. Nasmyth, T. Berdmore, Jobson, J. White, Blandin, R. Blake, S. Brown, and T. E. Bond. By the fourth number the circulation reached 511, with 174 subscribers. At the close of the first year the journal came into possession of the American Society of Dental Surgeons, at this society's organization in 1840, who issued it quarterly instead of monthly, and increased the price of subscription from $3.00 to $5.00 and changed the title to that of the *American Journal and Library of Dental Science.* For a period of ten years this society conducted the journal, Dr. Harris remaining continuously its chief editor, assisted by others, until 1850. After this date it was transferred to and conducted by him as a personal enterprise, until his death, which closed his editorship of twenty years' standing, during which time he was assisted by Eleazar Parmly, Solyman Brown, Edward Maynard, Amos Westcott, W. H. Dwinelle, A. A. Blandy, and A. Snowden Piggott. Dr. Harris was a voluminous and able writer, and contributed many valuable essays to the journal's pages.

Dr. Harris was the first to respond to the call of Dr. Hayden to organize the American Society of Dental Surgeons and was one of its sturdy supporters. It was on his motion the organizing convention resolved "That a national society of dentists be formed." He was chairman of the committee to prepare the society's constitution and was elected the first corresponding secretary of the society. In 1856-7 he was elected and served as second president of the American Dental Convention, which was the successor of the American Society of Dental Surgeons. Dr. Harris agreed with Dr. Hayden in the future educational needs of the profession and conceived the organization of a dental training school as an adjunct to the medical department of the University of Maryland, to whose faculty he made a proposition, but his overtures were rejected. They feared the chartering of a dental school would prove detrimental to the interests of the medical school, and strenuously opposed the movement, giving as an excuse "That the subject of dentistry was of little consequence, and thus justified their unfavorable action."

Not disheartened, Drs. Hayden and Harris went to New York city and consulted the leading men of the profession, and with their aid endeavored to establish a chair of dentistry in one of the New York medical colleges. Meeting with discouragement but stimulated with renewed energy, they returned to Baltimore, and during the winter of 1839-40, almost entirely unaided secured the signa-

tures of representative citizens to a petition to the Legislature of Maryland for the incorporation of a college of dental surgery at Baltimore. After numerous difficulties and considerable opposition by jealous medical rivals, which they finally overcame, the charter was granted, and with the aid of Drs. Bond and Baxley they organized the Baltimore College of Dental Surgery, of which Harris was the first dean. He was also professor of operative dentistry and dental prosthesis, and at the death of Dr. Hayden was elected president of the college. The college had the support of the members of the American Society of Dental Surgeons, which at the first meeting, New York, August 20, 1840, on motion resolved "That the society approve of the establishment of the Baltimore College of Dental Surgery, and will co-operate with the other friends of that institution in promoting its designs."

Dr. Harris received the honorary degree of Doctor of Medicine from the Washington Medical College at Baltimore, of which he was a professor in 1838. His D.D.S. was obtained from the American Society of Dental Surgeons, all of whose members were granted a diploma from the society, which entitled the holder to the title of Doctor of Dental Surgery. The honorary degree of Doctor of Dental Surgery was also conferred on him February 28, 1854, by the Philadelphia Dental College.

He had a number of honorary degrees conferred upon him by professional, literary, and historical societies. The degree of Master of Arts was conferred upon him by the Maryland University. He was an active member of the Maryland Historical Society. As a token of high esteem for distinguished professional labors and personal merit, he was made an honorary member of the Virginia Society of Surgeon Dentists, October 11, 1842. The Harris Dental Association of Lancaster, Pa., organized June 21, 1867, with Dr. John McCalla as president, was named in his honor.

He was correspondent and friend of many eminent public and professional literary men. He was a diligent reader and student and collected a large and valuable private library of many rare books, the finest in Baltimore at the time, excepting that of the Bishop of Baltimore, which was the most complete collection.

He kept up an extensive correspondence with authors and publishers in the principal cities of Europe, and had standing orders for anything old or new appertaining to dental science and art, all of which was gathered at his own expense.

Chapin Aaron Harris was married January 11, 1826, to Lucinda Heath, daughter of the Rev. Barton Downes Hawley, of White Chimneys, Loudoun Co., Va. Her mother was Katherine Heath, whose ancestor, the Roman Catholic Archbishop of York, refused to take part in Queen Elizabeth's coronation. Both families, the Heaths and Hawleys, were of high social position.

The Carmichaels of Maryland and Virginia, the Carys of North Carolina, and the Sturgis family of Kentucky were also relatives of Harris. His maternal grandmother was a Chapin, and for her brother he was named. To Dr. and Mrs. Harris nine children were born, viz, Darwin Barton, who died young; Ozella Louisa, who married Alfred Addison Blandy, M.D., D.D.S., an Englishman by birth, living at Zanesville, Ohio, and later at Baltimore, where he was associate editor, with Dr. Harris, of the *American Journal of Dental Science;* Zairah Cazilda, who married Louis Rimy Mignot, an artist of New York; Mary Caroline, who died young; Chapin Bond Harris; Alice Elizabeth; Irvan Lamer; Helen Pendleton Harris, and Anne Meredith Harris. The two latter are the only surviving children of Dr. Harris and now reside in London, England.

He loved art and literature. He was a devoted admirer of Sir Walter Scott, and knew a great part of "Marmion" and "Lady of the Lake" by memory; he also greatly admired Byron's poetry. One of his favorite works was Napier's "History of the War in the Peninsula"; Rollin's "Ancient History" was another work he much admired; also Motley's "Dutch Republic," Macaulay's "History,"

and Agnes Strickland's "Queens of England." He was an enthusiastic chess-player, devoted to young people, and the playfellow of all children. In all, he was a very lovable character, and is described by his children "as a most tender and devoted husband and father, and sincere friend; devoted to all good, public-spirited, benevolent works." He loved animals and was especially fond of horses and dogs.

He was extremely generous, and assisted his professional brothers and the poor liberally. He literally went about doing good. He brought up and educated nine children besides his own, and for years took care of and supported a sister and her son and a sister-in-law and her son. He kept "open house" and entertained many eminent men as his guests. Among his personal friends were Rufus Choate, Edward Everett, Longfellow, Lowell, and Henry Clay, with whom he corresponded for years.

At an early age he was deeply impressed by a sermon at a Methodist Episcopal church, and was induced to join it. He was a deeply religious man and a strong advocate of temperance. He was large-minded, and so free from sectarian bias that he numbered among his intimate friends Roman and Episcopal clergymen. He was especially fond of the Episcopal church, and was in the habit of attending it.

Dr. Harris is described as a remarkably handsome and intellectual looking man, six feet two and one-half inches in height; broad shouldered and finely proportioned, of distinguished carriage, and with a benevolent, kindly expression; he was courteous after the old school of polished gentlemen. His hair, naturally dark, became gray early in life. His eyes were of hazel color. In politics he was an old-fashioned Whig, and was an enthusiastic Mason, high in the degrees. A few years before his death he bought a small place near Baltimore, where he spent his leisure, enjoying nature, of which he was a great lover. Dr. Harris' death occurred on Michaelmas Day, September 29, 1860, and was due mainly to overwork. After a hard day's labor with professional duties and in the lecture room and infirmary at the college, he would write nearly all night, revising his "Principles and Practice of Dental Surgery" for a new edition. This continued extra work so overtaxed his energies that he was ill for eight months, suffering acutely with an obscure disease of the liver that finally caused his death in the midst of his usefulness, a martyr to his professional duties. He was buried in Mount Olivet Cemetery, Baltimore. On his unpretentious tombstone his Christian faith is engraved: "E mortuis resurgam" (I shall rise from the dead).

In recent years bronze memorial tablets to the memory of Hayden and Harris have been placed in both the Baltimore College of Dental Surgery and the Dental Department of the University of Maryland.

Liberal in life to an extreme, Dr. Harris failed to leave his family well provided for after his death. Shortly after that event a memorial meeting was called in New York, October 8, 1860, at which fifty prominent dentists attended, and a public subscription—known as the "Harris Testimonial Fund"—was started for the relief of his family. A committee was appointed for this purpose, with Dr. Eleazar Parmly as treasurer of the fund. After canvassing the profession for some months, at much expense, the committee reported that nearly one thousand dollars had been subscribed, but that about nine hundred dollars had been expended in collecting it—the balance of eighty-five dollars was sent to Dr. Harris' widow.

He was a leading light of dentistry, likely more highly distinguished and accomplished than any of his predecessors. Dr. Eleazar Parmly truly said of him at the time of his death, "He has labored more arduously as a practitioner, more untiringly as a writer, and more devotedly as a teacher of the principles and practice of dental surgery than any person who has in any way or in any country been connected with our professional art."

His unwearied labor and sacrifice of time and health for the advancement of his profession; his industry as a writer

and editor; his untiring efforts in building up the first dental journal, the first dental society, and the first dental college in the world's history—the three most important factors in our professional existence, all of which can be traced to the energy and foresightedness of Hayden and himself—made him a martyr to the profession that he so greatly honored.

THE RETENTION OF PORCELAIN CORNERS.

By RODRIGUES OTTOLENGUI, M.D.S., New York, N. Y.

(Read before the Dental Society of the State of New York, at the thirty-seventh annual meeting, held at Albany, May 12, 1905.)

THE chief charm of porcelain is its resemblance to tooth-structure. The main objection to gold is its total dissimilarity of appearance. From a purely cosmetic standpoint, therefore, porcelain is to be preferred to gold in exact ratio to the conspicuousness of the locality. Porcelain, for this reason, must have consideration in all cavities in the anterior teeth which involve the labial surface, and more especially such as encroach upon the incisive edge.

The retention of an inlay is quite as important a factor in the attainment of success as any detail of construction, for what availeth the beautiful if it be not durable? There are forces which tend to dislodge all inlays, but when we deal with those that reach the incisive edge (or occlusal surfaces) we meet an additional force not elsewhere to be dealt with—and that is masticatory stress.

The problem therefore is two-sided. For the restoration of corners of labial teeth, and more especially those in the upper jaw, we should as often as possible utilize the cosmetic advantages of porcelain. In this location, however, the antagonistic forces of masticatory stress must be overcome. It behooves us therefore first to well comprehend this stress; we must study especially its direction. With this knowledge firmly fixed we may so arrange our cavities in shape as to offer the greatest resistance and thus secure the best retention.

Many suggestions have been made for overcoming the difficulty, and if I turn aside a moment to consider one or two of these, it is mainly in order to lead your minds toward the question, Has any definite principle as yet been formulated which meets all cases, whether the teeth be alive or pulpless, whether large or small, whether thin or thick labio-lingually?

Before porcelain, of course we all were using gold. We all had fixed habits of cavity formation. It was but natural to attempt to insert the new filling material with as little alteration of our habits as possible. This accounts for the many inlays reported to have dropped out in the earlier stages of the art. Such occurrences compelling us either to abandon porcelain or else to abandon our habits of cavity shaping, a few attempted to secure their porcelain corners by the same fundamental principle which had held their gold corners fast. The one word which broadly describes this principle is —dovetail. It is dovetail whether we use slightly divergent walls, lateral grooving, or, to pass to the extreme, depend upon screws or posts of any sort. Lest some may deny that the screw or post comes within the principle of dovetailing, I have only to remind you that while it may not appear so when standing alone in the cavity, as soon as the gold is firmly packed about it, it becomes in principle but an extension, wing, or let us say dove-

tail from the filling. This method has seemed to some desirable in porcelain, and for the fixation of porcelain corners pins have been baked in the inlays.

To my mind this is not only an error (since no porcelain baked around a pin can be as strong as a similar bulk of the material which is homogeneous) but it is based upon a mistaken idea of the direction of the stress which is to be overcome. The advocates of the pin method usually place it at right angles with the vertical surface of the inlay, and it is supposed to enter either a pit or groove in the axial wall of the cavity. The nearer this pit or groove is made toward the incisive edge, the more it will weaken the incisive corners of both the natural tooth and the inlay; while the farther it is placed rootwise the more it must endanger the pulp. But, to my mind the chief difficulty is that it does not resist the masticatory stress. It is evident from its very location that it is intended to prevent the inlay from moving *laterally* away from the cavity, whereas it is my view that the tendency of the real stress is to force the inlay *labially*.

To abbreviate my criticisms of other methods I will allude to but one other advocated system. This depends upon either a broad, flat seat, or else the same sort of seat plus the advantage of a step. Both of these have served well, but it appears to me that their disciples have either failed to comprehend why they have met success or else they have failed to record the reason. However this may be, I am confident that at least some disciples of the flat seat, or of the seat and the step in combination, have believed that they succeed because they afford resistance to vertical stress, or stress in the direction of the long axis of the tooth. This, of course, is partially true, but I believe that the real reason is that in attempting this formation the operators have necessarily, though often unconsciously, produced exactly the required resistance, which is a resistance to labial movement. Thus the broad seat necessarily extends the cavity toward or past the linguo-gingival angle; the approximal surface, especially at the gingiva, being part of the arc of a circle, such extension lingually necessarily gives us a body of inlay which will receive the incisive edges of the opposing teeth, and in turn will be resisting the stress thus received because of the labial portion of the natural tooth. This is even more true where the step is cut, provided the step is made solely on the lingual surface. But this is not true when the step also includes the labial wall, giving us an inlay formed throughout in the shape of the letter L. That some good inlay workers do properly form their corner cavities, without really doing so with a full comprehension of the requirements, was well instanced recently when one of our best operators showed a specimen properly shaped and then declared that though it might seem that undue stress was thus brought against the labial wall, in practice he had met with no evil results. Now the fact is, that the seeming weakness, for which he partly apologized, was the real strength of the method.

Let us then analyze the direction and movement of masticatory stress.

I must first say parenthetically that this subject is so large that I am in this paper confining myself solely to the six anterior upper teeth, and even so can give but the fundamental principles, with a few practical examples to establish the universality of their application. I may say, however, in regard to the six lower anterior teeth, that the action of stress is totally different from what we find in regard to the upper jaw. If my hearers will kindly set their teeth edge to edge, and then slowly move the mandible till the molars are in occlusion, they will observe that throughout the action the stress upon the lower teeth is practically in the direction of the long axis of the tooth. This indicates the necessity for a cavity formation which has a broad seat. Is there any stress either labially or lingually? Practically none when the teeth are moved against each other; with the interjection of a piece of food, and during incisive action there is a slight labial stress. Thus the principle of retention below is the same fundamentally as above.

The application, however, is less radical, as the stress labially is much less.

Let us then consider our real problem, the action of masticatory stress upon the six upper anterior teeth.

A STUDY OF MASTICATORY STRESS.

It is masticatory stress that we are now to study, not occlusal stress. The latter means force exerted by the simple closure of the mouth. This, in relation to the problem before us, is barely worth a moment's attention, yet I fear many have thought of this kind of stress only. Masticatory stress, which is the force which tends to dislodge our porcelain corners, is stress exerted during the act of masticating, and this brings into consideration a third element—food. The teeth of the upper jaw are stationary; they must resist forces exerted by their antagonists which are set in the mandible, a movable bone, managed by very powerful muscles. If the tongue or cheek be accidentally caught between the teeth during mastication, the force exerted will be at once appreciated to a limited extent; I say limited extent advisedly, because the pain causes an instantaneous reversal of the muscular movement, and the full stress is thus obviated. So much for the extent of the force. Let us now examine its character.

At first glance one might liken the upper teeth to an anvil, receiving the strokes of the lower set as of a hammer. This is vertical stress, and it was presumably to meet this that the broad seat and the seat and step formations have been devised. Is such stress ever exerted? The answer is, that it is always present in a degree modified by other factors; but there are also times, important times, when the vertical stress is exerted unmixed by any other. This occurs in the incising of very hard, and especially of very brittle, substances. For example, If a child place between his teeth a stick of hard candy and bites off a piece, what results? First the closure of the jaws begins crushing the surface of the candy, and finally the candy yields to the stress and fractures sharply. It snaps suddenly, and the two sets of teeth are brought together with terrific impact, which often suffices to fracture the incisive edges of the natural organs. This is the stroke of the hammer on the anvil. This is vertical stress in its extremest expression. To meet and resist this, the inlay must have a broad seat. But there is another precaution which serves greatly. After the inlay is set, the patient should be made to close the incisors so that the operator may examine the end-to-end bite. The incisive edge of the inlay then should be trimmed off with fine stones or disks so that real contact in this moment of occlusion cannot possibly occur. The edge should also be beveled lingually so that all vertical blows will meet as little inlay surface as possible, and then glance. With an inlay so fashioned this terrific hammer blow is entirely avoided, for as the candy or similar food is fractured it ceases to be a separating medium; the teeth rush together through space, and strike *each other*. If the inlay is too short for this contact, it really receives no blow at all. Consequently we find after all that the shortening of the inlay is of more consequence than the seat in resisting this the hardest vertical blow that can reach it.

In the ordinary incision of other sorts of food we do not have this sudden impact but rather a grinding motion. But this grinding motion is accompanied by a well-defined vertical stress. The mandible moves distally. The upper jaw is stationary. The food lies between. The stress therefore is vertical to some extent, but chiefly it is pressure in a labial direction. The proportion of labial to vertical stress will be in exact ratio to the length of the over-bite. Thus in old age, with teeth worn down to an end-to-end bite, there is often little or no stress labially. Contrarily in the extreme over-bite, with some protrusion of the upper teeth, where, for example, the patient cannot really bring the actual edges of his incisors together, the stress vertically is at a minimum. In the typical bite, the over-bite is perhaps one-third of the length of the tooth, the resting-place of the occlusion being near the thick portion of the teeth. In these cases I should estimate

that the masticatory stress exerts about three times the pressure labially as compared with the pressure vertically.

To meet these requirements, then, we must have resistance to vertical stress, which may be obtained with a broad seat; and resistance to stress exerted labially, which means a standing labial wall.

There is one more analysis to be made before we fully comprehend the problem, and this brings us to a most important point. If there is stress labially and stress vertically, what is the mean direction of the stress? Geometrically considered it must be somewhere between these two directions. Let us draw a line across the approximal surface at the gingiva. This, a horizontal line, represents the stress labially; a vertical line, touching the labial face of the tooth will represent the vertical stress, and gives us a right angle at the labio-gingival angle. If we bisect this angle by a third line we will have the true direction of the stress, speaking generally. Really the direction of the stress varies during the incising action as the mandible moves, but is probably at its greatest tension at the moment of severing the food, which brings the teeth into actual contact always with a modified but real impact, as we met it in the incising of the candy. At this crucial moment, the stress is along the imaginary line which we are now drawing. This line extends from the union of the lingual and labial plates of enamel at the incising edge, diagonally through the tooth, and bisects the labio-gingival angle. What practical bearing has this fact upon our cavity preparation? A very important one. In preparation for gold we are told to cut the labio-gingival angle well forward to so-called self-cleansing areas. In a preparation for a porcelain corner we find through our analysis that we will need our greatest resistance exactly at this locality, and consequently my formula includes the necessity of conserving the tooth-material at the labio-gingival angle as much as possible, for it is here that we are to obtain the chief resistance to the labial stress which we must combat.

There remains now but one other direction of stress to be considered. We have argued till now as though the mandible moved in but one direction—up and down. But of course there is also lateral action. This is mainly observed, however, in the true mastication of food, and not so much in the act of incising. Still it is to be considered. There is, therefore, a slight stress tending to move the filling laterally. This is entirely overcome by grooving the gingival seat, which seat should also be extended well around lingually and should be as deep as possible at the angle formed at the extreme of this lingual extension, with the margin which rises vertically at this point. There should be a slight grooving along this, the lingual vertical margin, also. In teeth having living pulps this will result in a hillock in the center of the cavity, which protects the pulp and resists lateral stress at the same time. In deeper cavities, either in pulpless teeth or where caries prevents the formation of the hillock, the proportionate depth of the cavity and the groove recommended in the gingival seat will resist the lateral stress.

CAVITY FORMATION ILLUSTRATED.

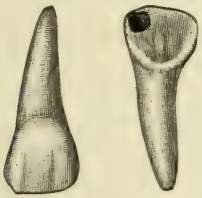
By a few examples I will now endeavor to show the universal applicability of the method. I deal solely with living teeth, because in pulpless teeth the depth of cavity which may be obtained obviates the necessity of following the method with such scrupulous care, the fact that the inlay may be deeply imbedded rendering the fixation practically simple.

The general principle first dawned upon me when a lady returning from Europe applied to me for the re-setting of a porcelain corner that had dropped during the voyage. She had nearly a dozen perfect specimens of porcelain art which had been inserted by the same European *confrère* who had lost this little filling. Its very smallness had brought about his failure.

This was indeed the smallest corner restoration I had ever seen (see Fig. 1, *a*). The dentist had simply deepened the cavity. The little inlay was practically

merely pasted on. It came out in three days. My inlay made for this case was as little conspicuous from the labial surface, but was fully four times as large on the lingual (Fig. 1, *b*). I extended the cavity lingually until I secured a broad surface to receive the labial impact, and

Fig. 1.

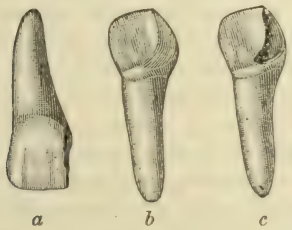


a *b*

a good labial wall to my cavity to resist labial stress.

For my next example let us consider an ordinary approximal decay involving a slight loss of the incisal corner (Fig. 2, *a*). I use small gem stones and disks with which I make the margins even and obtain the lingual extension advocated. This produces a flat or slightly depressed surface, not really a cavity at all. (Fig. 2, *b*.) The lingual extension follows around the gingival border almost or quite to the median line, and thence in a gentle curve returns to the incisive angle. With fine sandpaper disks the edges may now easily be trued up, and will need

Fig. 2.

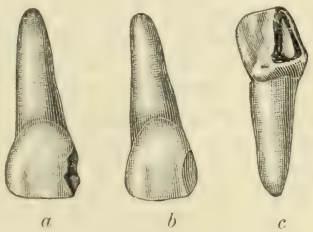


a *b* *c*

less attention later, than where the preparation had been made with burs from the start. The deepening and grooving of the cavity is next effected, the grooving at the gingival seat being as deep as the operator may consider advisable without weakening the tooth. The result (Fig. 2, *c*) is a cavity from which I do not hesitate to say that a well-adapted and properly set inlay cannot be dislodged by masticatory stress.

Next I show an extreme case, merely to emphasize my faith in the method. The cavity is extensive (Fig. 3, *a*) and has destroyed much of the labial wall, the very part of the tooth which I advise should remain, while the lingual surface is practically intact. Many would be tempted to merely scoop out the cavity, and set an inlay leaving the lingual wall as little touched as possible. This I deem to be a mistake. The fact that the incisal corner must be restored introduces all the actions of masticatory stress, and these forces will sooner or later dislodge a filling so fashioned. This cavity, therefore, is first stoned out and the labial margin straightened (Fig. 3, *b*), and then the

Fig. 3.



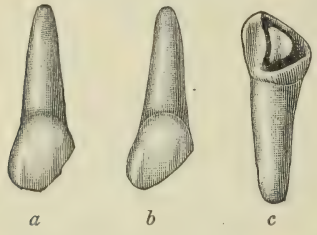
a *b* *c*

lingual wall is carefully removed. The full preparation is shown in Fig. 3, *c*. In such a case the support at the labio-gingival angle on which I have laid such reliance is of course less than it should be, but this is compensated for by the fact that as the entire lingual enamel is standing, the lingual extension is made so as to remove little more than the enamel, leaving the dentin, thus forming the hillock previously described. Thus although the labial wall had been lost by caries, our preparation has given us labial resistance, the hillock affording this in a very substantial part of the tooth.

Next let us take another extreme instance, one of the most puzzling that I have ever had. The tooth had carried a gold filling anchored foolishly with a screw set horizontally near the corner.

Fracture ensued, the gold dropped and I was asked to repair with porcelain an extensive corner fracture involving about a quarter of the tooth, both labial and lingual walls missing. The tooth appeared almost as though the corner had

Fig. 4.

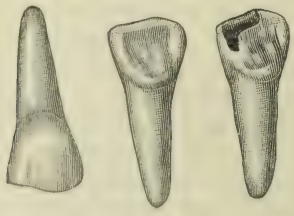


a *b* *c*

been cut off with incising forceps, while the pulp remained alive, and of course the tooth was very sensitive. (Fig. 4, *a*.) I first squared the fractured surface and perfected my labial line as usual (Fig. 4, *b*). The lingual extension was practically exactly as in the last, only seemingly more extensive. (Fig. 4, *c*.)

Two other classes of cavities may be just mentioned as departing slightly from the general run of cavities, but which still may be treated by this method. First, fractures in teeth caused by blows, either by falling or by biting candy, as mentioned. Such a fracture is perhaps most harassing in teeth thin at the incisal edge. One is shown in Fig. 5, *a*. It is first stoned smooth (Fig. 5, *b*),

Fig. 5.

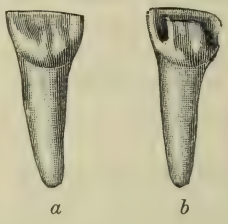


a *b* *c*

extension being made lingually so as to form an L, thus outlining a step. The final preparation (Fig. 5, *c*) affords a broad seat, part of which is at the approximal and part in the incisal step. The labial wall is higher than the lingual margin, and with the approximal grooving (which is deepest at the labio-gingival angle) affords all the resistance needed, labially.

Later in life, when the incisive edges are worn so that the dentin is disclosed, I have had gratifying results with porcelain. Such a tooth is shown in Fig. 6, *a*, and the preparation (Fig. 6, *b*) is the same as in the last, except that the approximal portions are cut away both mesially and distally. The labial wall can usually be left proportionately higher than in younger teeth, the pulp's recession generally permitting rather free lingual cutting. Here, however, as heretofore pointed out, we have more vertical stress to resist, the shortening of the teeth decreasing the over-bite. No attempt is made to lengthen the bite, by which I mean the porcelain is not built

Fig. 6.



a *b*

up so that it shows from the front. Neither is it contoured to restore the original square edge. It is beveled straight from the labial margin to the lingual margin. This lessens the incisal contact, renders the teeth more useful as incising organs and less useful for mastication, and, all combined, prolongs the durability of the result.

These suffice I think to establish the universality of the application of the method. There are other factors to be considered always, but these will occur to all. I may just mention one more. It makes some difference which tooth is to be repaired, and whether it be the mesial or the distal corner. For example, mesial corners of both upper central incisors occlude with but one lower tooth, while all other corners occlude with two. Mesial corners of upper incisors and laterals do

not suffer from lateral stress in the movements of the mandible, the excursion always being from the median line distally. If you will try this, my meaning will be clearer. Thus the lateral stress, if any, forces the filling *into* rather than out of the cavity. Contrarily, the distal corners of upper incisors receive any lateral stress that may be present. For this reason, perhaps, nature has rounded these corners, and we may well follow her example.

A FIELD FOR WOMEN IN DENTAL PRACTICE.

By EDWIN T. DARBY, M.D., D.D.S., Philadelphia, Pa.

THE title of my paper presupposes a fact—namely, that women are to practice dental surgery. It also suggests their fitness because it asserts that there is a field for them in dental practice. What that field may be is the purpose of this paper.

The advent of women as dental practitioners began about forty years ago and would make an interesting chapter in a history of the dental profession. As early as 1866 a few women were in dental practice. They had not received a degree in dental surgery but had succeeded to a practice from deceased husbands who were dentists.

For some of my facts I am indebted to Prof. James Truman, who has done as much or more than any other person to encourage women to enter a field which formerly men alone seemed qualified to fill. Nearly forty years have passed since he took a bold stand in behalf of women who wished to enter the dental profession. In a recent letter he says:

> I had long been impressed with the importance of opening up all avenues of industrial vocations to women on an equality with men, but the prejudice then existing against women in business or in the professions was, as you know, an almost hopeless barrier to any effort.
>
> The condition then was altogether different from the present, and he who attempted to force his way against the current took his reputation at the stake—for it was sure of final cremation.
>
> In March 1866 I was called upon to deliver the valedictory to a graduating class, and among other things I said:
>
> "Every human soul has certain qualities; those qualities should mark its pathway through life. Talent is of no sex, color, or clime, but is an inheritance from the Creator, given to be fully cultivated in the direction that it leads; hence, in my judgment, any attempt to cripple the aspirations of a God-implanted intelligence is unworthy the age in which we live and is little short of blasphemy against the Creator himself.
>
> "As we keep any number of the human race in a condition lower than ourselves, just in this proportion will the degradation be a millstone around our necks. The reverse of the proposition is equally true: as we advance the masses in intelligence and give them the means of acquiring information and the pecuniary rewards for labor, so will the civilization of all be increased.
>
> "Entertaining these views, I rejoice that dentistry has, though the youngest of the professions, welcomed women in two of our state organizations to full membership.*
>
> "I am sick of that cant and hypocrisy that would prevent a woman doing anything to earn her daily bread. Let your daughter enter the professions, or anything, through which she can earn a livelihood. The world is very slowly coming to an appreciation of this truth, but it will grow and become the belief of the nations in time."
>
> The developments since that day have fulfilled and more than fulfilled the prophecy contained in that last line.
>
> The great prejudice existing against women following this vocation is manifest in a paper

* These were not graduates, but at the time in dental practice.

by Dr. George T. Baker published in the *Dental Times* for April 1866.

After giving his views at length in opposition to women entering dentistry, he closes with this paragraph:

"Impressed with the truth of this position, I propose to offer an amendment to the constitution of the American Dental Association, at its next meeting in Boston, to allow none but males to be eligible as delegates from local societies."

At the meeting of the American Dental Association, held at Saratoga, 1869, I offered the following resolution:

"*Whereas*, The recent action of two of the oldest colleges of dentistry in this country in admitting women to the full honors and duties of the profession renders it imperative upon this national delegated body to take some action in reference to their admission into full fellowship in the profession; therefore be it

"RESOLVED, That in view of the successful result obtained in the education of women as dentists, we recommend to subordinate associations to admit to full membership any woman duly qualified.

"RESOLVED FURTHER, That in consultations, considerations of sex should be avoided, ability and moral character alone being the standard of judgment in all cases."

On motion the resolutions were laid on the table. This was fully expected by the author of the resolutions. The object was obtained, however, in setting many to thinking, and the results were soon manifest in the larger number of dental colleges adopting coeducation as a principle.

Mrs. Henriette Hirschfeld matriculated in the Pennsylvania College of Dental Surgery, Philadelphia, in the fall of 1867, graduating in the spring of 1869. Her first year was a stormy one owing to the opposition of the professor of anatomy. She was, as you know, obliged to take her anatomy in the Woman's Medical College and also in a private dissecting school. The second year was more harmonious, and she took the full course. Subsequently three other women matriculated and went through the first course without special opposition, but were refused entrance to the second term. I carried the matter to the trustees, and after two hearings of the faculty side and my own the matter was placed in the hands of Judge Peirce, who rendered what was equivalent to a legal decision, which in substance was, that the original matriculation must be recognized in the light of a contract and be fulfilled to the letter. The women were reinstated, two graduating in that college and one in Baltimore.

Mrs. Hirschfeld subsequently secured a most profitable practice in Berlin and married a retired surgeon of the army, Dr. Tiburtus. She retained her former name of Hirschfeld in business until she retired several years since. She had two sons, one a surgeon in the navy, who died recently of fever in South Africa; the other is a civil engineer in Berlin. She enjoys a competency, after a life of activities in efforts to help others. She educated two of her nieces in dentistry, one of whom succeeded to her practice, and a sister of her husband graduated in medicine and is in practice also in Berlin. Mrs. Hirschfeld is now 73 years of age. We thought she was the first woman in the world to graduate in dentistry, but the Ohio College of Dental Surgery claimed this honor, if it be an honor. The woman receiving this degree was graduated, I think, the session prior to Mrs. Hirschfeld. Whether this was after two courses, or one, I do not know.

You ask me, "Are you still in favor of women in dentistry?" and "Have they realized your expectations as dental practitioners?" I can certainly answer the first: I am still in favor of women fitting themselves for dental service.

The second question is not so readily answered. It is probable that I, in common with a few others, expected too much. We did not take into consideration the tremendous antagonistic pressure brought to bear against them, both from the public at large and in the profession. They have been practically isolated professionally and have not had that incentive to greater perfection readily obtained by the other sex. In the mere practical work they have not excelled, or at least have not given the evidence I had hoped for at the beginning, and, with two or three exceptions, they have made no additions to dental science in thirty-six years. This I did not anticipate, for the strained efforts to make a living precluded all hopes in this direction. The exceptions are, however, led by Dr. Vida A. Latham of Chicago, whose work has not been excelled by any man, although some may have been more original, and her election to the presidency of the Section of Stomatology, American Medical Association, was a merited appreciation of her scientific record.

I believe as the prejudice against women in the professions—medicine, law, and dentistry—becomes weaker, as it must, there will be witnessed a broader view of the work in these several callings than now appears upon

the surface. Woman's natural intuitive sense will eventually lead to rapid deductions, but, on the other hand, I doubt whether she will excel man in the logical arrangement of her facts.

I have spread my reply to yours over some pages. I do not suppose you will care to make use of anything I have written, but I felt like placing it on paper without much thought whether you were familiar with the facts or not.

I look back to this portion of my work with more satisfaction than any other, perhaps because it cost me more, in that my colleagues failed to understand the underlying principle involved and made me suffer in consequence.

These are the words of a descendant of the Society of Friends whose mission it has been to preach the emancipation of women and the equality of man. From 1866 until the present time women have been in attendance at this and other dental schools and co-education in many of the dental colleges has existed without any marked difficulty.

The dental schools connected with universities have in some instances declined to accept women. Some have done so because of their objection to co-education, and others because it was thought inexpedient to teach anatomy and physiology to mixed classes.

Knowing that there has been from the first a strong prejudice against women entering the profession, but believing that prejudice has diminished as the years have passed, and with a view to getting the consensus of opinion from the schools which have educated women in dentistry, your essayist has recently sent the following letter to twenty-five schools, thinking that an honest expression of opinion from those who have taken part in their education might aid in determining the question of woman's fitness to practice dentistry and possibly give to you some data upon which to base an opinion as to whether the number of women in dentistry is increasing or otherwise.

The letter reads as follows:

I am making a study of the relative fitness of women to practice dentistry, and shall be greatly obliged if you can help me by answering the following questions. Your answers will be held in strict confidence and no mention will be made of your name or school.

First. Do you educate women for the practice of dentistry in your school?

Second. Do you find them as good or better students than men?

Third. Are their examinations as good as those of men?

Fourth. Does the average woman student do as good work in operative dentistry as the average male student?

Fifth. Does the average woman student do as good work in prosthetic dentistry as the average male student?

Sixth. Does the average woman student exhibit the same ability to withstand the fatigue incident to long operations that men do?

Seventh. About what proportion of women continue in practice after graduation?

Eighth. About what proportion of them attain reasonable success in practice?

Ninth. Do you think the number of women entering upon the practice of dentistry is increasing or otherwise?

Tenth. About how many have graduated from your school?

Of the twenty-five schools thus addressed, nineteen have sent replies. Of this number, twelve take women as students; the other seven do not.

The replies to my questions have been almost as varied as the number of schools represented, although upon some points there has been great unanimity of opinion. In reply to the first question, Do you find them as good or better students than men? Nine schools have replied "Yes"; three schools have replied "No." Some have qualified their answers as follows: "As good, if not better for books." "As a rule they are more faithful and industrious, but lack the intellectual capacity of men." "Nearly equal." "They are as good as the average men, but not equal to our best men." "Not as good as the best men, nor as poor as the worst; just average."

In reply to the third question, Are their examinations as good as those of men? Eight schools have replied "Yes"; four schools "No." In reply to the fourth question, Does the average woman student do as good work in operative dentistry as the average male student? Eleven

schools have answered "No," and but one "Yes." In reply to the fifth, Does the average woman student do as good work in prosthetic dentistry? Eleven schools have answered "No," and one school says "Just about."

In reply to the sixth question, Does the average woman student exhibit the same ability to withstand the fatigue incident to long operations? Ten schools have answered "No," and two schools "Yes."

In reply to the seventh question, About what proportion of women continue in practice after graduation? there seems to be a great difference of opinion. Some schools report 66⅔ per cent., some 25 per cent., some 75 per cent. Some have replied, "It depends upon how soon they marry." Others say, "Small proportion," "Most of them marry and quit."

In reply to the eighth question, About what proportion of them attain reasonable success in practice? Some schools say as high as 90 per cent., others place it at 66⅔ per cent., and still others as low as 25 per cent.

In reply to the ninth question, Do you think the number of women entering upon the study of dentistry is increasing or otherwise? Eight schools have replied that it is diminishing. Two have replied that it is increasing, and two cannot tell.

In reply to the tenth question, About how many have graduated from your school? The answers range from "One" to "Two hundred."

The aggregate number from the schools which have been heard from is 568 who have graduated from American colleges since 1866. Since sending out this letter of inquiry I have learned that a similar letter was sent as late as 1902 to the deans of the various dental colleges by Dr. Edward C. Kirk of the University of Pennsylvania. He has allowed me to examine the answers from twenty-five schools, and the replies are similar to those which came to me in response to my letter of inquiry.

From the foregoing replies it would appear that there is a decided difference of opinion in the minds of dental educators as to the fitness of women to practice general dentistry, but this is not surprising, for there has been from the first a general sentiment against women in dentistry. Nor is this feeling confined to dentistry alone. You all know how general has been the antagonism of the medical profession against women as practitioners of the healing art. The same may be said of law, of architecture, of any of the arts and sciences. It is not many years ago that woman's sphere of duties was limited to those of a domestic character, but the world has made progress, and the barriers which were set for women have been broken down, and today there are few positions which she has not filled with efficiency and with great credit to her sex. Look for a moment at the diversity of occupations in which she is engaged: In the professions of medicine and law; as teachers and preachers; as architects and chemists; as professional nurses and accountants; as bank clerks and insurance agents; as stenographers and typewriters; as saleswomen in all the mercantile houses; as telegraph and telephone operators—in fact, in nearly all the activities of commerce and business life they occupy places (and apparently with the same efficiency) which were formerly filled by men alone.

It has been claimed by some that women have no right to usurp the prerogatives of men, or even trespass upon ground which they have from the beginning occupied; but this is a question in ethics which we are not called upon to settle at this time. It may, however, be said in passing that it has never seemed reasonable to suppose the Creator intended this world for one sex alone, and so long as the human race exists there will probably be unmarried or single women who must gain a livelihood by their own exertions, and it would seem an ignoble procedure to debar them from the opportunity to engage in any calling or pursuit promising success or a living.

The golden rule is not an ethical formula to be observed only when dealing with men, and he who would practice its precepts in the highest degree will accord to women in a larger sense the rights and privileges which he enjoys.

Your essayist has never been fully persuaded that women are fitted for the general practice of dental surgery, although he has helped to instruct them in their practical work and in some instances has seen evidence of marked mechanical ability, but a few examples of this kind are not sufficient to prove that the average woman who studies dentistry is competent to practice it. As a rule, women do not excel in difficult operations in the mouth, nor in the prosthetic branch where great mechanical skill is required, although doubtless many of you have seen operations made by women which would have been a credit to any man.

It has been urged as an objection to women in dentistry that they do not possess the physical stamina requisite to practice a profession which demands such an outlay of vitality as is given by the dentist who is engaged each day at the operating chair, but it is claimed by women who have been in active practice that the strain upon them is no greater than that endured by other women who are engaged in other pursuits, and this may be quite true in the case of some women, but I question whether it be true of the majority of those who become dentists. Again it has been urged that her sympathetic nature is such that rather than inflict the pain necessary to perform thorough work in operative dentistry, she is inclined to save the patient pain at the expense of thoroughness. Possibly it would be well for our patients if some of us were a little more delicately organized along these lines. It is possible in this day of advanced science to be thorough without the infliction of pain. It is not a question of fact but a question of our willingness to take the necessary care and time to avoid it. Let us be fair to the woman and presume that she uses obtundents more frequently than we do and thereby gains a reputation which she does not deserve.

It is undoubtedly true, that fewer women are entering the dental profession than formerly. This is doubtless owing in part to the prejudice which exists against them. It is also owing in part to the other avenues which are being opened to women whereby they can gain a good living with less expenditure of time and money to fit themselves for efficient service in those employments. The cost of a dental education at the present time is far greater than when two sessions of four months each was all the time demanded of the candidate for a dental degree, and the average woman who finds it necessary to make her own living is not often possessed of the means required to pay her expenses through college with the possibility of failing in her examinations before the faculty and the examining boards. Then the long period of waiting for practice, with large expenses for office rental and maintenance, discourages her, and she finally abandons her profession and marries, or engages in something that will bring her quicker returns.

In spite of these objections and discouraging conditions your essayist is of the opinion that there is a field for women in dental practice. It may not be as large a field as she now attempts to fill but one upon which she can enter with less costly preparation and with the prospect of greater success and earlier pecuniary returns. It is not absolutely necessary that she be a graduate in dental surgery. Possibly one year spent in a dental school would suffice. Another year in a training school for nurses and a pupilage of a few months with a dental practitioner would fit her for the position of assistant.

I have read with much interest the paper of Dr. M. L. Rhein delivered at New Orleans in May 1903. Also one before this society at its annual meeting the same year, upon the "Trained Dental Nurse," and while I agree with the suggestions embodied in those papers I would enlarge the scope of usefulness which a woman assistant could fill in the practice of each of us. There are manifold things which a trained woman could do for the busy dentist toward saving his time, and demanding no great amount of skill on her part. First of all she could thoroughly cleanse the mouth and get it in condition for operations upon the teeth. She could prepare a chart show-

ing the number of operations required. She could introduce wedges, change applications, scale and polish the teeth, and last but not least, bake inlays, and insert them if necessary. If porcelain inlay work has come to stay there is in it a field which it would seem that an apt, intelligent woman could fill with great efficiency. Women as a rule are quick to discern color and shades. They have the artistic sense and delicacy of touch. They are not to be regarded in the same sense as the office girl or secretary, but as the assistant to the dentist.

Her chair may be alongside his or in an adjoining room, but not so remote that frequent supervision of her work would be difficult or impossible. When not engaged at her own chair she could be at his, gaining additional instruction and making herself useful in various ways. Such a one, quick of perception, deft in execution, should command a salary sufficiently large to afford a comfortable living, and possibly something more for advancing years.

There is nothing in this paper intended to disparage or belittle the work of the women who are now engaged in dental practice. There are, I am informed, about three hundred such women in the United States alone. Some of them have been successful and are enjoying a remunerative practice. To all such I would offer words of encouragement. But there are others who have met with failure and are discouraged if not totally disheartened. To such as these I would suggest an association with one who needs just the help that I have outlined in this paper, and although they may not have reached the goal which they had in view, they may find the path an easier one than others have trodden in their effort to be self-supporting.

IMMEDIATE PROSTHESIS IN MAXILLARY RESECTIONS: METHOD OF CLAUDE MARTIN OF LYONS.

By Dr. FRANCISQUE MARTIN, Lyons, France.

(Read before Section VIII, Fourth International Dental Congress, St. Louis, Mo., September 1, 1904.)

GENTLEMEN: I wish to revert to the question of immediate prosthesis after maxillary resections, and to lay before you the present state of my father's practice and my own.

The question, as you are of course aware, is not a new one. Dr. Claude Martin's work on "Immediate Prosthesis," giving a summary of twelve years' practice, dates from 1889; the work also gives technical details on the construction and application of the apparatus, and makes numerous observations. Five years later, Claude Martin published a new work, giving the later results of his method.

It is not my intention to reproduce here the numerous and conclusive observations presented by Claude Martin at different congresses and learned societies. I wish simply to recall to your minds the essential points of the method and lay before you the state of my father's practice which has varied but little since 1893, the date of his last work on "Resultats éloignés de la Prothèse immediate," and also to refute certain objections that are continually being made, several of which appear to us to be unfounded.

I will not dwell at length on the construction of apparatus of the immediate prosthesis class; all the details referring to this question are fully explained in the treatise on "Immediate Prosthesis." I shall refer, therefore, in a cursory way to the molding of a natural maxilla of average size. This operation gives us a hollow mold, which we fill with melted

wax, and as this mold is composed of several parts it is easy, as soon as the wax is cold, to remove it without injury. We thus obtain a wax maxilla absolutely identical with the natural one, and which may be modified by molding it according to requirements. We now hollow out canals in the middle of the thick part of this maxilla, two for the ascending branches and one for the horseshoe. In these canals are placed zinc tubes filled with flake-white, the ends of which are stopped with wax. We afterward put it into a muffle as an ordinary set of teeth.

To render the filling easier, we only make a three-quarter maxilla, that is, the horseshoe and one ascending branch. When we have to place a complete maxilla we take two halves, which we join together with plates and screws. These apparatus being very thick and of black india-rubber, we bake at a low temperature, 145° C. for three hours. We afterward soak in diluted hydrochloric acid for one or two days in order to dissolve the zinc tubes, and we now have an apparatus for immediate prosthesis. We have only to pierce the surface with several holes communicating with the canals made by the zinc tubes; through one of these holes in the front and upper part of the horseshoe and which has been made a little larger, we drive a metal tube that joins a second india-rubber tube by which we make our irrigation at high pressure.

We now prepare our plates and screws for fixing the apparatus ready for use at the moment of operation.

Such, gentlemen, is a rough outline of the way we make the apparatus, and for many years we have only modified some of the minor details.

As regards the first application of the prosthetic apparatus during the operation, I shall not go into minute details, but simply insist on certain points of the operative manual.

(1) As to the choice of an apparatus: Before making an immediate prosthesis apparatus, it is indispensable to take the impression of the patient's upper maxilla, especially if it be a question of replacing the mandible, so as to establish an apparatus of such a size, that what will be the alveolar border in the prosthetic piece corresponds as exactly as possible with the normal articulation of the patient. It is therefore most important to make an apparatus of a proper size, so that when it is replaced by the definitive piece there is no risk of establishing a defective articulation of the artificial teeth with the upper teeth; this is a matter to be well considered from the outset and which has a definite value.

(2) The manner of fixation: As soon as the apparatus is completely finished we screw on to it the plates, which must also be fixed by screws to the remaining fragments. Here I beg to call your attention to a new arrangement that Claude Martin presented and explained at the Munich congress in 1892. He used to fix his apparatus to the bones behind with a large metal plate bearing on the lingual face of the maxilla, and before by two horizontal lamellæ. These two latter he has modified by placing longer ones and crossing them like an X, so that the lamella which is fixed to the lower part of the apparatus is screwed to the upper part of the remaining fragment and inversely.

This arrangement prevents all movement of the apparatus, which consequently no longer rubs against the remaining fragment in the movements of the jaw, and it insures an absolute fixity even if there be but one fragment. We shall see farther on the importance of this fixity of the apparatus, when we consider the question of a relapse after prosthesis.

(3) Another point on which we have insisted for many years, although practitioners do not appear to attach the importance to it that it deserves, is the absolute necessity of making during the days following the operation, frequent irrigations under high pressure. When we have been able to attend very closely to our patients we have not allowed a single day to pass without calling several times to see that these washings have been carried out by reliable persons according to our instructions; we have thus been able to form an opin-

ion of what may be expected from our method.

An objection has been made that these washings, begun immediately after the operation, cause hemorrhage in displacing the clots of blood. We do not consider this objection well founded; frequent washings do not appear to us to injure the hemostasis, especially if they are made with a very warm antiseptic solution; and besides, by preventing infection, they also prevent secondary hemorrhage. In fact, we have only observed hemorrhage in two cases, in which instances the surgeons had forgotten a plug in the wound. Hemorrhage may also take place through the laceration of one of the temporal arteries, which are not always sufficiently obliterated by torsion in the disarticulation of the ascending branch of the maxilla. Prosthesis, however, cannot be held responsible for this accident.

(4) Another objection made to immediate prosthesis is the difficulty experienced in replacing the primitive apparatus and the length of time required before it may be substituted by the permanent one. I do not think this objection is justified, even in the case of an operator of even average skill. In fact, if the screws are near the ascending branch and consequently somewhat distant from the commissure of the lips, it is sufficient to use a chisel as a lever on the head of the screw in order to easily remove it.

In other cases we have resorted to the following plan: As frequently the two halves of the apparatus are fixed to the median line by a screwed plate, all that is required is to unscrew the four screws that fasten it in order to set the two halves of the maxilla free, and then by grasping with the left hand one of these halves it is possible, without causing much pain to the patient, to pull forward the branch of the corresponding bone, bringing it sufficiently in front to enable one to easily remove the screws that fix it to the apparatus.

The provisional apparatus once removed, the permanent one has to be placed. The following is the technique usually followed by Claude Martin: Before changing the apparatus we take an impression of the mouth of the patient, of the remaining fragment or fragments, and the upper edge of the temporary apparatus. We cast this impression, and then construct an apparatus in such a way that it will have, by means of clasps and laminæ, a solid hold on the teeth of the remaining fragment; and at the point where the dental arch of this piece corresponds to the temporary apparatus there is a groove into which the ridge of the apparatus fits. As soon as the temporary apparatus is removed we place it in that groove and fix it there with two or three screws. Add the time required for adjusting all these apparatus on the model of the remaining fragment that we obtained by the first impression, to place the model and apparatus into plaster, and the time the latter takes to set, and all is finished. The few minutes this operation takes up will certainly not give time for the cicatricial filaments to draw the fragments nearer to one another, for as soon as the plaster is dry the groove screwed to the primitive apparatus, the canals of which have been stopped with hard wax, is replaced into the mouth of the patient just as a simple set of teeth. and there is ample time to construct a definitive apparatus that will thus be made exactly like an intermediary arrangement, since the immediate apparatus adjusted to the piece fitting to the teeth of the remaining fragment has given us, by placing it in this last mass of plaster, the complete casting of its lower edge.

All this is much more quickly executed than described, for it requires just the time to screw home two screws and to wait the few moments necessary for a small quantity of plaster, mixed with salt or alum, to become sufficiently hard.

Such are the principal and different points of the operative manual to which I wish to call your attention.

Before concluding I wish to discuss, and to refute before you, the principal objections that have been raised against immediate prosthesis. These are principally two, viz—first, that it favors

the infection of the wound; second, that later on it becomes the cause of a relapse.

The first of these objections was made twelve years ago by Boennecker.* "The piece of rubber," says the German author, "that covers the soft and bony sectioned parts does not allow a free discharge of the secretions, and one cannot be sure of the asepsis of the apparatus. In the prosthesis of Dr. Martin a backward step is made as regards the treatment of the wound. . . . He places a foreign body which promotes retention, and hence, the disinfection of the mouth being impossible, it is a serious fault against antisepsis."

As Claude Martin replied long ago, these objections are entirely theoretical, and appear to be puerile to those who see us daily practicing our method. Let us, however, discuss them in order to enlighten the members of the congress upon the important question.

The disinfection of the buccal cavity is quite possible, and even quite easy to effect, if the rules we have laid down be carried out. The question of the antisepsis of the mouth after operations followed by prosthesis has always been Claude Martin's desideratum. "It is for this reason," he writes, "that we have in our prosthetic pieces hollowed out canals of irrigation opening on to all points of the cruentous surface and through which it is easy to make antiseptic washings." We were so convinced of the efficiency of the means we have adopted that we did not hesitate to make the washings ourselves in the hospital wards when the temperature of the patients rose, to prove that with a little care a complete disinfection could be effected and a stop put at once to the accidents of retention.

Boennecker, continuing his remarks, calls attention to the fact that we mention in our observations a case of erysipelas and another case in which there was a particular fetidity of the mouth.

It suffices to reply that the complications referred to by Boennecker took place in 1878, a period when antisepsis was in quite a rudimentary stage and when we had not yet made use of our apparatus fitted with irrigation canals. We think, indeed we are certain, that in taking as a basis our practice of the last twenty years, and with our apparatus facilitating the washing out of the parts, every infectious accident should disappear, especially if care be taken to make, as we recommend, irrigations of the buccal cavity under high pressure. From this point of view, and we cannot insist upon it too strongly, Esmarch washings must be absolutely given up. This manner of irrigation, which we too often see employed by ill-trained hospital attendants, does not give sufficient pressure. Eguisier's irrigator must absolutely be used, which gives a pressure of $7\frac{1}{2}$ meters. *In frequent washings under high pressure lies the whole secret of success.*

We now come to the question of a relapse after immediate prosthesis.

Immediate prosthesis has often been incriminated, and even today by some surgeons, as inducing a relapse. This opinion is based, we think, much less on an examination of facts than on a generally admitted idea that the causes of mechanical irritation are also the causes of tumors. This idea of general pathology is correct, but in the particular case referred to an ill-judged application of it was made. In fact, the prosthesis apparatus, solidly fastened, cannot be compared to a mobile foreign body, which by its frequent change of place is necessarily a cause of irritation. Although the fixing arrangement, described above, has only been presented a short time, relatively, my father nevertheless had already made use of it for a considerable time before, and I hasten to describe it to you, being convinced that henceforth such a reproach can no longer be laid to the charge of immediate prosthesis.

A strict examination of facts, in the numerous observations that my father possesses, some of which date as far back as twenty-five years (see the publication mentioned above), refute entirely such an objection. Moreover, we do not hesitate to say that immediate prosthesis

* "Ueber Unterkieferprothese," *Verhandlungen der Deutschen Odontologischen Gesellschaft*, Berlin, 1892.

offers, on the contrary, a guarantee against a relapse. In fact, the prosthesis apparatus whatever its size may be, is just as easy to fix; consequently the surgeon, when he has recourse to immediate prosthesis, is more at ease in making a large ablation of the tumor, which indeed is the principal guarantee against a recurrence.

Such, gentlemen, are the conclusions my father has arrived at after nearly thirty years' experience with immediate prosthesis. This method has always given both to him and to me excellent results. It has the great advantage of replacing at once the resected bony fragment by an apparatus of the same size and form and capable of fulfilling the functional rôle of the resected part. Lastly, it does not expose the patient to the least danger, either immediately or later, to infection or relapse, assuming that the rules we have laid down be carried out and that even the slightest details be carefully observed.

ART AND UTILITY IN FILLING OPERATIONS.

By WILLIAM B. DUNNING, D.D.S., New York, N. Y.

(Read at a meeting of the First District Dental Society of New York, January 10, 1905.)

THE consideration of the legitimate scope of art in dental work must always be with us an important field of interest. How far it is well to attempt to conceal our efforts to repair decrepit nature, and at what point we must set aside the esthetic for the useful, is an everyday problem, and, in the nature of things, an unending one.

In the spirit of his work, the dentist is a modern product. The needs of the flesh have demanded care from the first; but the effort upon man's part to follow nature's intention in the preservation of the beautiful is a refinement that has come with civilization. The oral specialist, in addition to his duties as physician and surgeon, must be, in his more apparent aspect, an artist.

This is a broad subject; but I mean to confine what I have to say to the question as applied to filling operations. In coming to particulars it is evident that the purpose of this paper is to discuss the principal filling materials we now have at our command in the light of two opposing factors—art and utility—both ever present in varying relative importance—to be reconciled according to our ability as operators.

GOLD.

Although the introduction of porcelain has set a degree upon the pre-eminence of gold, that noble metal stands undoubtedly first in the list of filling materials for all-round usefulness; and the fact is to be deplored that manipulative excellence during recent years has not kept pace with our increasing knowledge of its working properties. The reason for this is evident, but the excuse doubtful.

We have been very properly interested in the relief of pain and the minimizing of fatigue in our operations, and with the help of inlays and amalgam have done much for patients who simply cannot afford the nervous tax of long sittings. No one doubts the wisdom of a compromise that secures a point against the alternative of failure to do anything, and discouragement on the patient's part that leads to complete neglect. But the number of persons who really belong to this class is smaller, I think, than many of us realize. We are of course inclined to consider the comfort and the convenience of patients; but I am pretty sure we are apt also to be influenced by the whims and ignorance and petulance of many who

should be tactfully but firmly brought to see the real importance of permanent work.

Of course the packing and finishing of gold is tedious, but the degree to which it is really to be dreaded rests largely with the operator. My point is that many men have followed the line of least resistance with their patients since the introduction of amalgam and inlays—and have lost something of the finer skill that was attained in the days when gold was the only material to use. This is saying nothing against other methods of filling, upon which we must all at times depend; but merely deploring the deflection from a most worthy ideal—the making of perfect gold fillings.

For, all things being equal, a cavity of decay perfectly filled with gold has received the most permanent treatment we are capable of giving, in the light of our present facilities. We may in time come to discover that an inlay resting in a bed of cement will outlast in point of sealing a cavity anything we can do with gold alone; but a quarter of a century or more must pass before that point can be finally settled. Meanwhile, patients come to us for the *best* we have to give them.

In a practical sense, gold occupies a middle ground in our work. We aspire to porcelain; in amalgam we hide our despair; but the manipulation of gold achieves, with a standard of effort, a certainty of result that carries the bulk of our practice to enduring success.

Ideals as to structure and form in gold fillings are constantly changing, of course. Many extreme teachings have come into vogue, and have vanished—leaving, however, a certain impress in the long path of progress. Certain theories have developed into truths, in our belief, by dint of the test of time. Naturally the restoration of contour in approximal cavities suggests itself as the most important lesson we have learned in the filling of teeth. It is universally agreed now that the building of such fillings to the precise form set by nature is ideal practice. But, thanks to the same background of experience, we have also learned that we cannot afford to give more than a proportional value to any one factor in a line of procedure. That is, we cannot, unfortunately, follow the ideal of the restoration of contour to the exclusion of other considerations. In certain malpositions of teeth it is frequently wise to exaggerate or change the shapes of contiguous surfaces, in order that opposing enamel surfaces may be permanently held apart.

One very important consideration, involving a deviation from the practice of perfect contour, is the unsightliness of gold in anterior teeth. It will be instantly said that porcelain has come to end that difficulty; but I think we are not yet so fortunate, except for extensive cavities. We are rapidly learning the uncertainty in making dependable *small* inlays; and we all know what can be done in small cavities with gold. Now a comparatively minute cavity in an approximal surface of an upper incisor will frequently require extensive cutting for either porcelain or gold, if the ideals of contour and extension for prevention are to be thoroughly carried out. With porcelain the result may be well if the color and fit are perfect, and if the work *lasts;* with gold such procedure should be called malpractice. There is absolutely no excuse for the outrageous crescents of gold that have been made in thousands of incisors in the filling of small cavities—any theory of ideal form to the contrary notwithstanding.

We can all, probably, recall in our practices how certain elderly patients have drawn our attention to minute, invisible gold fillings in such surfaces, which, they have said, have been there thirty or forty years. We marvel at the record and the simplicity of the operation; and then reflect upon how thoroughly the men in the old sink-or-swim days understood the adaptation of gold to cavity margins. Where we may not avail ourselves of the very obvious advantage of carrying margins well beyond the danger of contact, we are, I believe, justified in falling back upon the perfection of adaptation and finish, as a bid for permanence, in this special class of cavities. Knowing what can be accomplished, the danger of recurrent trouble is a lesser evil than risking

the loss of tiny inlays, or the brutal disfigurement of contoured gold.

In the bicuspids, appearances must still be considered; but in coming to the molars the esthetic is outweighed by practical considerations as to rigidity, resistance to wear, and the full preservation of the area of mastication. In this region cavity preparation and restoration of contour should be thoroughly carried out, with a view to the most permanent operation consistent with the strength of the tooth.

It is perhaps needless to say that certain liberties cannot be taken with gold. Nothing can atone for lack of proper adaptation or condensation; and there is a limit, of course, to the speed with which gold can be packed. Where it is not advisable to attempt a very large gold filling at a single sitting, it is quite feasible to divide the work into two or more sessions, being careful, however, that each section of the filling is fully condensed and finished before removing the dam. A half or a third of a filling, complete in itself, may be safely left (covered with gutta-percha) until a subsequent sitting, when upon freshening the surface of the gold with a bur, the work may be continued without misgiving. This has been a long-known fact, but does not seem to be well known, considering its great value in the making of gold fillings.

In a few words, gold, beyond any other material at present, reconciles art and utility in filling operations. Our work with it may be useful and beautiful, within limitations that include the vast bulk of our needs. Its color is not inharmonious in the half light that reaches bicuspids and molars; the practical objections apply only to very difficult and extensive cavities. While involving the highest skill, its requirements are easily understood, and the results definite. Incidentally the mental attitude that a patient borrows from the operator concerning his work is a most valuable point gained in the tolerance of deliberate or tedious operations. This education of patients is of vast importance. The operator who judiciously dominates his patient will not lack appreciation of his best effort, and willingness to undergo inconvenience to secure it—to say nothing of a desire to preserve such work by the best care.

AMALGAM.

With the investigation of Dr. Black and others, we have arrived at a partial understanding of the physical properties of amalgam. The best alloys on the market afford reasonable uniformity in working qualities when skilfully manipulated. But the idea that amalgam, because it can be put in like a piece of putty, may be safely used without all the precision required for gold, is a mistake that has done immense damage in its insidious letting down of standards of work.

In difficult and inaccessible cavities, a perfectly inserted and finished amalgam filling is of course infinitely preferable to a gold one about which there is any doubt. Except under very unusual conditions such a filling is not justifiable when visible in a mouth opened in conversation or laughing.

In large approximal cavities, amalgam can be used to great advantage in direct combination with gold. With a snug matrix about the cervical third, that portion of the cavity may be quickly and perfectly filled with a quick-setting alloy, so solidly tamped down that a slight excess is squeezed over the margins—which means, incidentally, that the mass is homogeneous. Upon that foundation, built squarely to a desired point, a few pieces of crystal or fibrous gold may be readily united by amalgamation, and when the mercury no longer appears under the plugger the ordinary form of gold may be packed at once. By the time the gold is in, the amalgam will be found hard enough to finish perfectly. My reason for mentioning this well-known procedure in detail is to call attention to the many opportunities this affords to take advantage of the qualities we most want in amalgam—in the thorough and quick and permanent filling of doubtful regions—and yet avoiding the dreaded unsightliness of amalgam alone.

In this brief consideration of amalgam I desire to emphasize the limitation of its

use to cavities in which it is strictly indicated, rather than dwell upon its many excellences, fully apparent to all, which may stand without a champion. In other words, I am concerned as to its wide abuse. A mouth much filled with quickly finished amalgam takes on a discouraging look that has a direct moral effect upon the patient, not to say the operator. An amalgam filling should be perfectly carried out and finished; and when the crystallization is not hastened by the use of gold, this can only be done at a subsequent sitting. The patient should be made to appreciate the operator's effort in making a highly polished surface that may be kept clean and bright.

PORCELAIN.

Porcelain is still in its genesis with us. Although crude inlays were attempted twenty-five years ago, that work as an art is so young that we are still awaiting, as it were, the first returns.

It seems likely that successful inlay work will be limited to cavities of moderate or large size. Very small inlays lack strength and are not easily retained. I have so far been fairly fortunate in the setting of inlays, having lost but a few, and I believe with only one exception they have been too small to admit of sufficient roughing and under-cutting.

With our present knowledge it seems wise also to limit the use of porcelain to cavities so conspicuous that the use of gold is prohibited. We have already reached a point where there is no excuse for gold in upper labial cavities of any size; and the same may be said of approximal cavities in upper anterior teeth involving the labial wall. Of course, circumstances alter cases—especially in dentistry. These remarks may not apply to the case of an elderly man with a mustache, and a jaw that opens and shuts like a steel-trap.

Cavity preparation for porcelain is still in its experimental stage. Time and many failures will eventually give us a simple, understandable technique—and then we shall probably learn that the limitations of porcelain in this regard, and in connection with the color problem, are far more sharply drawn than we realize at present. Thousands of beautiful operations will have gone as shattered hopes—but that knowledge will be priceless.

I think in our enthusiasm, in view of perhaps boundless possibilities, we should "tread softly and speak low." We must beware of rashness that may throw into disrepute this exquisite art. That will not be the outcome; but I fear a somewhat necessary reaction following a first burst of recklessness in porcelain work that even conservative men have indulged in. The whole process of action and reaction is necessary and worth while; but the end must be reached by men who live down their mistakes by infinite patience and care, and unending belief. The successful porcelain worker of the future will possess a rare mixture of common sense and artistic ability.

PROCEEDINGS OF SOCIETIES.

FOURTH INTERNATIONAL DENTAL CONGRESS, ST. LOUIS, MO., AUGUST 29 TO SEPTEMBER 3, 1904.

(Continued from page 985.)

SECTION IX: Education, Nomenclature, Literature, and History—*Continued.*

Chairman—TRUMAN W. BROPHY, Chicago, Ill.
Secretary—WINTHROP GIBLING, Chicago, Ill.

THIRD DAY—WEDNESDAY, AUGUST 31.

The section was called to order at 2.30 P.M. by the chairman, Dr. Truman W. Brophy.

The first paper was that by Mons. B. PLATSCHICK, of Paris. [This paper, "L'Œuvre de Pierre Fauchard dans la Prothèse dentaire," will be printed in the forthcoming Transactions of the Fourth International Dental Congress.]

FOURTH DAY—THURSDAY, SEPT. 1.

The session was called to order by the chairman at 3 P.M.

The first order of business was the reading of the report of the Committee on Nomenclature, by the chairman, Dr. A. H. THOMPSON of Topeka, Kans., as follows:

REPORT OF THE COMMITTEE ON NOMENCLATURE.

It was the custom of the old Roman nobility that as one of them proceeded along the way, a slave ran beside the chariot to tell the occupants the names of those whom they met, announcing them as they approached. This slave was called the *nomenclator,* or namer. From this word, and from *nomen,* a name, we obtain the terms that refer to the naming of things, and hence also the science of nomenclature, which has to do with the exact designation of names and their application. Words are thereby made fit things as tools for work. "Nomenclature," the Standard Dictionary says, has reference to a "System of names or of naming, especially to one used in a particular art or science, also a systematic and alphabetic list of technical names." It seems to be a question whether the word "terminology" would not be better for our use in this sense, as it has a more specific reference to the technical terms in use by a science or an art, *i.e.* the more exact application of terms in work. The distinction might be made that "nomenclature" has reference to the giving of names to things, while "terminology" designates the exact, the refined application of terms and names to things and ideas, to the end of facilitating work.

There ought not to be any argument or question as to the desirability, even the necessity, of a complete and exact terminology for the use of the dental profession. Its position as an acknowledged scientific occupation should warrant the possession of a nomenclature that is scientific, exact, universal and accepted. That this condition does not prevail, is, to say the least, not honorable to a profession claiming to be scientific. To be sure, the great special sciences, as chemistry, zoölogy, botany, and others have but recently put their terminology upon a scientific basis and secured some-

thing like harmony. But they have cleared up *their* nomenclature, and it becomes us of the professions which are founded on the special sciences, to clear up *our* terminology and introduce scientific accuracy and harmony. The rank and file of the dental profession are indifferent to the value of care and exactness in the use of terms, and it unfortunately happens that men in high places, journalists, and writers, are also careless and lacking in the conscientious conception of their duty in this regard. They have a responsibility in the example they set that they should appreciate, and should endeavor to aspire after, greater exactness in the selection and the use of terms. A slovenly nomenclature is a great hindrance to work; poor words are like poor tools—good work cannot be performed with them. That this is true has been demonstrated frequently in the history of all the sciences. Not only does confusion arise owing to the use of different terms for the same thing or idea, but the effort wasted in explanation and adjustment of harmony is a distinct waste of brain power—and brain power is the most valuable thing in the world. The great argument for a scientific terminology is economy of brain power, that the world may have the benefit of the highest efficiency of genius, and of trained workers. Nomenclature is in its last analysis, therefore, an expediency, a means to an end, a tool to work with, that more and better work may be accomplished. But it is a most valuable tool, and therefore deserves the greatest possible consideration and cultivation. Our protest, therefore, is against the indifference of the profession as to the real value of an exact and scientific nomenclature. The arguments have been frequently presented before to the profession, for the subject is not new, but we have failed to impress its members with the fact that an exact terminology in general use and acceptation would be a great economy of time, energy, and brain power, and would inevitably lead to the greater efficiency and usefulness of the dental profession. We would, therefore, urge all of its members, but especially those in high and influential places, to consider their conscientious duty in this regard and to endeavor to bring about a better condition of things in this respect, to the end of advancing the honor of the profession.

On this great occasion, also, when America is honored by the presence of so many of our eminent and respected foreign *confrères,* the subject of a universal terminology for our profession in all European languages must receive our serious consideration. The essays herewith appended by the foreign members of the committee will deal with this branch of the subject. It is the earnest wish of the committee that some steps may be taken toward the ultimate accomplishment of the preparation of a universal terminology, that will be understood in all languages. Science is a universal brotherhood and knows no political, linguistic, or geographical boundaries. Scientific men are of one blood, one purpose, one language—and that language should be universal and uniform. Other sciences have such a universal language, and it becomes us as a great and universal profession to prepare a terminology that shall be uniform in all languages, by which the *confrères* of all nations may read each other's literature and learn of each other's work and be enabled to communicate with each other in the common interest of furthering our beloved profession in all lands. To that end it is the earnest desire that steps may be taken at this great meeting to bring about "a consummation so devoutly to be wished." Dr. Chas. Godon speaks of the work of securing an international nomenclature, and it is to be desired that steps should be taken at this congress to further the undertaking.

In America there has been some progress made in the improvement and harmonization of our nomenclature. Committees appointed at the meetings of the American Dental Association through the seventies and eighties, accomplished a preceptible beginning. Old, popular, and unscientific terms were gradually dropped and many of the better names suggested by those committees were adopted and became part of our current literature and general usage. All honor

to the workers of those early days, for their task was difficult and thankless, and the obstacles and opposition they encountered were enough to discourage less heroic souls. But they builded wisely and "their works do follow them." The foundations they laid were deep and lasting, and we are today enjoying the benefits of a better nomenclature, owing to the excellent pioneer labors of those early enthusiasts in the field. They found chaos and they left order to a degree that is surprising when we consider the condition of the current terms in common use in the profession. They accomplished wonders in making a beginning, and we cannot but record our appreciation of their labors in first blazing the way for subsequent workers. With their work for a foundation, after-workers have been enabled to accomplish more than they would otherwise have been able to do without the labors of those early pioneers.

The terminology of our profession has been greatly improved since the next initiative made by the committee on nomenclature at the World's Columbian Dental Congress, at Chicago in 1893. Their report was an excellent new starting-point, and from the suggestions then made much good has resulted in the improvement and harmonization of our nomenclature. The problem of the whole subject was so ably discussed in all of its bearings that the arguments do not need to be presented again. It is only necessary to refer to that excellent *résumé* for the exhaustive presentation of the subject in all of its relations. That report undoubtedly exercised a great influence on the profession, and stimulated the appreciation of the necessity for formulating a better nomenclature, and interested students in the investigation of the subject. We may even hope that it assisted at the birth of a conscience on the subject, and that writers and speakers have perhaps better than ever before realized their responsibility to the profession and to the public, for their influence in the use and presentation of a proper terminology. We would like to believe that the suggestions of that committee have been largely adopted by the profession, and that they have been productive of great good. Indeed, we cannot but believe that the impulse there given to the subject eventuated in the next most important step in the evolution of the subject.

At the meeting of the American Dental Association held at Asbury Park in 1895, a committee drew up and presented a considerable list of words which it was hoped would introduce more harmony in the use of terms. This report and list was adopted by the association and was very generally accepted by the profession at large and used to a great degree by text-books and journals. A great step was taken when this list was adopted, for we then had an authoritative list of terms from which to work, and the gradual elimination of duplicate words and inappropriate terms has made some progress since that list was accepted. There has been some conflict of opinion as to the propriety of some few terms, different names for the same thing each having their advocates who upheld their rival claims with great energy, but on the whole there has been less controversy than might have been expected, considering the revolution that the report proposed in the use of names. This was largely due, of course, to the determination of the committee to retain those terms that were most in use and acceptation, and in cases of confusion and controversy giving preference to that term which had the most advocates or was the most scientific.

Perhaps the most difficult task the committee had, or that any reformers of nomenclature will have, is the elimination of so-called popular terms, which, like the popular names of animals and plants, are often local, or confined to sets or classes of persons, and which are varied from place to place or from class to class. This is one difficulty with the rank and file of the profession yet, *i.e.* the use of common, popular terms for things and ideas, that are unscientific and undescriptive. There is an inclination on the part of scientific men also to the use of terms that they consider better and more scientific, as against those proposed by the American Dental

Association committee. Some of these will be noted later.

Right here this committee would make the first recommendation and suggest the first rule for the simplification and harmonization of our nomenclature, viz, *That a spirit of loyalty should pervade the profession that is sufficient to sink all preferences that are not in harmony with an acknowledged authority, and to accept their rulings, to the end of securing uniformity.*

The American Dental Association committee was such an authority, duly appointed, and their report and list was formally accepted and adopted. This list, therefore, became the official list of the profession in this country, and as such should be accepted by the profession and its writers and speakers. The terms there proposed should be employed by all until corrected by the National Dental Association as the central authority. That authority is final, and should be so accepted by the profession in a spirit of loyalty for the greatest good to the profession. There is little use of a committee on nomenclature proposing reforms if their authority be not acknowledged and obeyed. To be effective their decisions must be arbitrary if any progress is to be made, and where it is shown they are wrong such errors must be corrected by the central authority. But this committee insists that when terms are adopted by such authority that they should be accepted by the profession, and that the love of harmony and simplicity should be sufficient to warrant the setting aside of all personal preferences in favor of the adopted terms. Otherwise the work of all such committees is in vain, and might as well not be done so far as attaining the ultimate and much desired result of a perfect and uniform terminology.

As a recent writer before the Botanical Section of the American Association for the Advancement of Science, at the recent meeting in St. Louis, said, "Doubtless all will now agree that any rational system of nomenclature must be based strictly on priority. This itself is a long step in advance, for the earlier systematists laid less stress on priority than on the supposed appropriateness of a name. The unfortunate result of their practices we are suffering from now, *i.e.* that it is impossible to bring their work into harmony with ours without adopting rules and methods that are necessarily more or less arbitrary. Let us, then, nerve our minds to the point of seeing not only many, but if necessary *all* of our most favored names sacrificed to consistency, and unite in adopting the simplest and most direct code of rules that can be agreed upon." This is the spirit of our sister sciences, and it should be *our* spirit in the interests of uniformity and of loyalty to the honor and advancement of our beloved profession. Therefore, your committee would make a special appeal to all members of the profession to adopt the terms and names officially decided upon by the committees on nomenclature, to the end of securing a better and more scientific terminology, and that those terms, if they are to be corrected, and they will often need to be corrected—for the committees are but human, and with all their investigations and research will commit errors—that corrections should be made through the regular channels of the nomenclature committees and the national associations. The committee makes this appeal in the interests of harmony and for the honor that would accrue to the profession in having an exact, scientific terminology.

We are now past the discussion of the desirability and advantages that will follow the reformation and improvement of terminology. That part of the subject has been ably presented by various writers and committees on nomenclature, and their conclusions generally accepted and acknowledged. We have now come to the stage attained by most of our sister sciences, *i.e.* the discussion and if possible the solution of disputed points and terms that are still in controversy. The bulk of the terms in common use are fairly uniform and satisfactory, but there are still many that are in dispute, or duplicate terms applied to the same thing or idea, that require adjustment. All disputed terms should be well considered, especially those which have many friends and supporters, and which

are in conflict. Then there is the introduction of new terms for new things or ideas which are new to the profession. The selection of a nomenclature for a new specialty is a very important and delicate matter, and one that needs to be undertaken advisedly. Then there is the increased refinement and differentiation of meanings, by which old terms that were too general and loosely applied were made to cover too much ground and which must be divided and specialized. Therefore, your committee will confine itself to suggestions along those lines, and avoid duplication of previous work as far as possible. The call sent out to persons invited to become members of the committee stipulated that lists of terms were desired as follows: new names for new things, ideas, discoveries, methods, etc., better terms for the correction, elaboration, or displacement of old terms, etc., but that generally adopted and accepted terms should not be listed. In other words, that we would take cognizance only of the advancements made since the adoption of previous reports of special committees on nomenclature. Disputed terms and applications of terms would require attention, of course, and it is an unfortunate fact that several such controversies exist. In regard to some of these disputes the committee reiterates the wish that the disputants would accept the decision of the committee of the American Dental Association of 1895, and tentatively, at least, adopt its rulings in the name of harmony. Many new words have come into use in the new departments, as of porcelain work, which require to be listed and passed upon. It is most imperative that such terms should be harmonized at the beginning of the organization of a new branch, for uniformity can be easier secured at that time than later, when varied and diverse terms have come into use in different localities. In such new departments the committee would urge the listing as completely as possible of the terminology and its adoption by the congress, to the end of promulgating the terms widely and giving them the authoritative sanction of this great body. This is one of the most important duties of this committee, and it is to be earnestly hoped that something may be accomplished in all of the new departments. The old question of priority will always be with us, perhaps, as with our sister sciences, and of course all harmony-loving members will accept that which has the best claim. We are not in the quandary of the biologists, however, in having great need of a multiplicity of names and difficulty in finding terms that have not been employed. We have not exhausted the possibilities of ancient and modern languages, and yet some terms are employed in duplication that need to be investigated and the first application decided.

Among disputed terms in controversy, and one of the most prominent, is that of the "cuspid" *versus* the "canine" teeth. It is a curious fact that the disputants are ranged along two lines, *i.e.* the anatomists stand for "canine," and the operators for "cuspid." The American Dental Association committee of 1895, said, "We believe it to be more harmonious and appropriate to use the word "cuspid" instead of "canine" to indicate the single-cusped teeth, just as the term bicuspid is applied to their neighbors. Both terms are given in the list offered, and confusion has existed in regard to the terms ever since. A definite decision should be reached by this body, so that there may be harmony. It is a very evident fact that if we are to rank as a scientific profession and have a nomenclature in harmony with other sciences, that we should employ the term "canine," as that term is applied by all odontologists to this particular tooth in all mammals. It is not worth while to discuss the propriety of the word; it has been arbitrarily accepted by zoölogists, and that is reason sufficient for all odontologists accepting it, even in human odontology. It describes the position of the teeth in relation to the other teeth, which is the important thing in anatomy. The more popular name "cuspid" is advocated on the ground that it is a single-cusped tooth, but this is too indefinite. Sometimes other teeth have but one cusp, as

in some forms of the lower first bicuspid. Black's "Dental Anatomy" gives the preference to "cuspid." Mr. Chas. Tomes' "Dental Anatomy" says that "The canine is the next tooth behind the intermaxillary suture above, and the lower canine is the tooth which closes in front of the upper canine." It is, of course, modified from the premolar series, and so is distinct from the incisor series. Mr. Tomes says that "It should be borne in mind that its significance is merely equivalent to caniniform premolar." Owen says in "Odontography": "When the tooth which succeeds the incisors, or the first of the upper maxillary bone, is conical pointed and longer than the rest, it is called a 'canine,' as is also its analogue in the lower jaw, which passes in front of it when the mouth is closed." Huxley says ("Anatomy of Vertebrates"): "The distinction between canines and molars is one of form and position in regard to the remaining teeth, the most anterior of the teeth behind the premaxilla-maxillary suture, if it is sharp and projecting, receiving the name of 'canine.' There are never more than four canines." Mr. Jno. Tomes ("Dental Surgery") uses the term "canine." Koecker ("Dental Surgery") employed the term "cuspid," or rather the Latin form "cuspidatus," which so many of the old writers used. Jno. Hunter ("Nat. Hist. of Human Teeth") also employed the Latin "cuspidatus." Thos. Bell ("Diseases of the Teeth") uses "cuspidatus." James Snell ("Operations on the Teeth") used "canine." In the World's Columbian Dental Congress report there is an excellent tabulation of many terms from which, as well as the authorities herewith quoted, it is plainly demonstrated that there has always been, as far back as there has been any mention made of this tooth, great confusion and lack of harmony in the names given to it. Therefore, your committee respectfully urges that this congress should pass upon and decide authoritatively upon a proper term to employ and the profession be urged to adopt that term for the purposes of harmony and uniformity.

Much confusion exists also in regard to the name that should be given to the articulating surfaces of the teeth. The question was exhaustively discussed by the W. D. C. report and the American Dental Association report of 1895. The terms "occlusal" and "morsal" are still in general use. Both words are given in the American Dental Association list, with the preference for "occlusal," in which conclusion the present committee concurs and hopes the congress will put the seal of its approval and that the profession will accept and adopt it. It is the better and preferable word, for many good reasons that are given in the aforesaid reports. But that the term "occlusal" is not really scientific, is well shown by one of the essayists in his observation of the meaning and application of the name. However, as it is in the most general use, it would be best for the congress to adopt it arbitrarily and for the profession to conform for the sake of harmony. Words that have been so long in use, without regard to their appropriateness, should be accepted in the interests of harmony. It is too late to create and introduce new words for such common things and expect them to be accepted and adopted.

A much-disputed term and one that requires to be dealt with by authority, is that of "cast" *versus* "model," as employed in prosthesis. The balance of opinion seems to be in favor of the word "cast," for the reasons best presented by Dr. Geo. H. Wilson of Cleveland, O., in the paper appended. But much confusion still prevails among prosthetists, and it would be well to have a definite decision on this term.

An innovation that the chairman has had in mind for many years and that he now believes should be inaugurated, is the better naming of the parts of the molars to be in harmony with the comparative odontologists. This is especially desired when human odontology is nowadays studied from the comparative standpoint, and with reference to their evolution. The present system is awkward and unscientific, as well as hampering to the student in his studies of general

odontology. The change proposed is to adopt the terms employed by all of the comparative anatomists and thereby be in harmony with this great related science.

These terms are briefly as follows:

Protocone. The mesio-lingual cone or cusp of the upper molar.

Paracone. The mesio-buccal cusp or cone.

Metacone. The disto-buccal cusp.

Hypocone. The disto-lingual cone.

Hypoconule. The fifth tubercle (when present).

Protoconid. The mesio-buccal cusp of the lower molar.

Metaconid. The mesio-lingual cusp of the lower molar.

Entoconid. The disto-lingual cusp.

Hypoconid. The medio-buccal cusp of the lower molar.

Hypoconulid. The disto-buccal cusp, or fifth cone.

These terms are as far as we would go at present, leaving the more complicated terms of the bicuspid, or premolar, cones for a later innovation. But your committee would urge the adoption of the terms in preference to the old cumbrous designations of the present compound words; for the sake of simplicity and ease of use; for the history that each name carries of the evolution of the part; for harmony with the terminology of the sister science of comparative odontology on which we are dependent for all that we have of real anatomical science in the study of the human tooth, and finally for the ennobling and uplifting effect that the study of the wonders of nature through the illumination of evolution has upon the human mind. The evolution of the human molars is one of the most beautiful things in the whole realm of nature, and the civilizing effect of such a study upon dental students cannot be overestimated. Hence we urgently request the adoption of this valuable terminology in the description of the human molars.

In conclusion, your committee would recommend the careful selection of a permanent committee on international nomenclature to follow and co-operate with like committees of this and other countries, associations, and congresses to consider and promulgate the idea of an harmonious system of terminology that shall apply to all countries. It is not expected to employ the same words in all languages, but it is to be desired that similar words shall be employed that will be translatable into the same meanings and application. We earnestly recommend this step in the interests of the universal brotherhood of the dental profession and the simplifying of the confusion that now exists in our terminology. It will assist materially in perpetuating the bond that has been created at this great congress between the dentists of all lands, and the obliteration of political, linguistic, and geographical boundaries.

[Forming a part of the report were recommendations and suggestions by Dr. Geo. H. Wilson, Cleveland, Ohio; Prof. Dr. Hesse, Leipzig, Germany; Dr. W. T. Reeves, Chicago, Ill.; Dr. W. C. Gowan, Creemore, Ontario, Canada; Dr. Charles Godon, Paris, France, etc.]

Dr. Geo. H. Wilson, Cleveland, Ohio, contributed the following

Report on Prosthetic Nomenclature.

I submit this report for consideration, recognizing that some of the words have been adopted by the lexicographers and many writers; but it seems wise to again bring them to the attention of the profession. When two or more words are used to convey the same idea it is advisable that the best should be adopted and the rest discarded. Some definitions and some words should be given special significance.

The term *prosthesis* should be given the preference over the term prosthodontia.

While "prosthesis" is applicable to the restoration of any lost part, I believe it has now been so associated with the dental profession that we are justified in appropriating it and thus defining it: *Prosthesis*—the art, science, and esthetics of restoring the lost dental organs and their associate parts with an artificial substitute. Art and esthetics are both

used because art has a double meaning, and in this definition I would have it mean mechanical perfection, while I would use esthetics to represent the ideal —the harmonizing of the instrument with the associate parts.

If we are justified in using the words "prosthesis" and "prosthetist" as nouns, and not the words "dentistry" and "dentist," then the one strong argument for "prosthodontia" is gone. The Standard Dictionary seems to recognize such use.

"Prosthodontia" is too limited; it refers only to restoring the teeth, and the rest must be inferred.

The term "mechanical dentist" should be limited to the laboratory man, and implies that he does not work directly for the patient but for the "prosthetist" who does all the work at the chair, while the mechanical dentist, as such, never sees the patient. The one implies the "artist," the other the "artisan."

Tray (not cup) for taking impressions.

Impression. A negative likeness of an object or part from which is produced the cast.

Maxillary Surface. Applied to the inner surface of both upper and lower trays and impressions. (Suggested by Dr. Weiss of Minneapolis.)

Cast or *Model.* While there has been much agitation over these words, there is a strong tendency to retain the old and objectionable word "model." "Cast" implies exactness, because it is poured or formed in an impression or mold and is a perfect reproduction of the object. "Model" implies something to be copied or over which a thing is made, as the sculptor's model of clay or staff may be heroic or diminutive, is to be copied in outline, but is not an exact reproduction, only an aid to the creation. The painter uses a model, not for the purpose of exact detail, but as an aid to depict the animation or soul. The dressmaker uses a model over which she forms the garment, which is not designed to fit the human body, but to shape the body to an ideal form. Therefore the accepted use of the word is inappropriate to its general application to dentistry, while "cast" conveys a definite idea. It seems best to limit the word "cast" to plaster and its compounds, and "die" to a metal cast.

Models are used to make dies, and consist of the cast being properly trimmed, an addition of wax and possibly plaster, and a glaze upon the surface, which is copied exactly. Models are used extensively by students in technic work. In the practice of dentistry casts are never copied or reproduced, but are used to produce the negative likeness.

Denture. Used to designate a completed piece.

Plate. Should be limited in its use to the base-plate upon which the denture is constructed: vulcanite, silver, gold, or platinum.

Contour. Not plumpers.

Porcelain. A solidified suspension of one or more insoluble, infusible substances, in a fusible silicate, which acts as a flux or bond.

Vacuum Chamber. Not air-chamber.

Flasking. Where a piece of work is enclosed in a flask, as vulcanite and cast work.

Invest. When no flask is used, as in solder work.

Rubber. While in a soft state, before the application of heat to the sulfur and caoutchouc.

Vulcanite. After the application of heat to a mixture of sulfur and caoutchouc; may be either soft or hard.

Ferrule (fer'-il). A continuous band about a tooth for sustaining an artificial denture.

The following terms were recommended for adoption by Prof. Dr. Hesse, Leipzig, Germany:

Corona dentis.
Tubercula (coronæ) dentis.
Collum dentis.
Radix dentis.
Apex radicis dentis.
Facies masticatoria.
Facies labialis (buccalis).
Facies lingualis.
Facies contactus.
Facies medialis. } Dentium incisivorum et
Facies lateralis. } caninorum.

Facies anterior. } Dentium præmolarium
Facies posterior. } et molarium.
Cavum dentis.
Pulpa dentis.
Papilla dentis.
Canalis radicis dentis.
Foramen apicis dentis.
Susbstantia eburnea.
Substantia adamantina.
Substantia ossea.
Canaliculi dentales.
Spatia interglobularia.
Prismata adamantina.
Cuticula dentis.
Periosteum alveolari.
Arcus dentalis superior.
Arcus dentalis inferior.
Dentes incisivi.
Dentes canini.
Dentes præmolares.
Dentes molares.
Dens serotinus.
Dentes permanentes.
Dentes decidui.

Dr. W. C. Gowan, Creemore, Ont., Canada, proposed the following fixed definitions:

Drug. Any substance used in the composition of medicine.

Medicine. Anything applied for the cure or lessening of disease or pain.

Remedy. Any medicine, appliance, or treatment which cures disease. The word "remedy" should seldom if ever be used in the plural. For example: "We keep 'drugs' and 'medicines,' but not 'remedies.'" The "remedy" for an alveolar abscess is a course of surgical and medicinal treatment; for a diseased and useless tooth the "remedy" is extraction. Carbolic acid, arsenic, cocain, oil of cloves, are "drugs." When applied to disease they are "medicines."

Treatment. The manner of applying a remedy—which may be surgical, mechanical, or medicinal. The word is not properly used in the plural.

Articulate. To joint.

Articulation. A joining, as of the bones; the parts between the joints.

Occlude. To absorb, as a gas by a metal. (Standard Dictionary.)

Occlusion. A closing of an opening, passage, or cavity; the act of occluding or absorbing.

(It would seem that the relation and contact between the upper and lower teeth is neither "articulation" nor "occlusion." We need a more appropriate term.)

Superior and *inferior* (as of the jaws or teeth). These words, derived as they are from the Latin, are properly used to qualify words of the same derivation, as "maxillary," "dental," etc. But the Anglo-Saxon words "tooth," "jaw," etc., should have the Anglo-Saxon words "upper" and "lower" to qualify them. In English we use the words "superior" and "inferior" in the sense of better and worse, in comparing the quality of one thing with another.

Cuspid and *Canine.* Cuspid is preferable, as it is significant of the thing named, and simplifies the nomenclature, for "cusp" and "bicuspid" are approved and established names for things. "Canine" pertains to the dog. A dog's molar or incisor is really a canine tooth. And besides, the long cuspid is not characteristic of the dog alone, as other mammals have it.

Dr. W. T. Reeves, Chicago, Ill, proposed the following terms applying to porcelain work in particular:

Porcelain.
Bodies.
High-fusing.
Low-fusing.
Translucent.
Opaque.
Tense.
Porous.
Baking.
Fusing.
Biscuit.
Glistening-biscuit.
Glazed.
Full-glaze.
Gassed.
Gassing.
Disintegration.
Burned-out.
Developing-color.
Over-baked.
Bulk.
Feather-edge.
Edge-strength.
Friable.
Attenuated.
Porcelain operative dentistry.
Porcelain restorations.
Porcelain fillings.
Porcelain crowns.
Porcelain bridge-work.
Metal construction.
Platinum solder.
Contouring.
Carving.
Building-up.
Drying-out.
Popping-off.
Checking.
Cooling.
Annealing.
Staining.
Mineral stains.
Oil-paints.
Cavity preparation.
Knife-edge margins.
Joints.
Butt-ended joint.
Lap-joint.
Saucer-shaped.
Seating-form.
Surface-retention.
Frictional-retention.

Discussion.

Dr. Louis Ottofy, Manila, P. I. I was intensely interested in the subject of nomenclature while I lived in this country, and I am even more so at the present time, for I realize the great importance of a uniform system as a result of a larger field of experience. In the Philippines the native dentists speak Spanish well, but little English, while the Americans understand but little Spanish. The disadvantage of a lack of uniformity is noticeable in our dental society, in which a common nomenclature would be of great benefit. For instance, the natives still use the terms "approximal," "anterior," "posterior," etc., while "mesial," "distal," "occlusal," etc., are new to them.

Similar valuable papers to the report under discussion, have been presented before, but, so far as I know, no definite and final action has as yet been reached. Whatever terms seem irrevocably satisfactory should be adopted internationally, and not changed, except for the very best of reasons. I have been accustomed to the term "canine," and have barely become well familiarized with the word "cuspid," when I now learn that the former, after all, is the correct one. I trust that through the International Dental Federation definite results may be promulgated in the near future.

Dr. James Truman, Philadelphia, Pa. It seems to me that while I sympathize with the effort to change the terms, yet human nature is human nature, and it is utterly impossible to work out this matter by any resolution or any action of any congress of individuals. It has got to come by a process of evolution. These terms will grow, and their eventual adoption will be effected, but it will take years for this. It is a language itself—practically a new language—one made in the last sixty or seventy years, and in the years to come we will grow into the use of these terms. I believe Dr. Thompson took the position that "canine" should be used in place of "cuspid." I think he is right. I use that term almost exclusively. I think the term "premolar" should be used in place of "bicuspid." That is the term usually used by comparative anatomists. I think Dr. Ottofy was correct in going back to the original terms. I seldom use the terms "mesial" and "distal" for I think "anterior" and "posterior" cover the position very well and they are terms that have been in use very much longer; but this is altogether a matter of taste. But this effort to create new terms by rule and expect them to be adopted is equivalent to preparing a universal language for the world—doomed to failure from its inception.

Dr. Henry W. Morgan, Nashville, Tenn. The question of the adoption of terms in which to express one's thoughts is usually a matter of a man's education. Much depends upon the text-books used when he was a student. In operative dentistry, terms used must be in accord with the terms used by the anatomy studied. In the institution with which I am connected we adopted as a matter of convenience a dental anatomy using the terms "mesial" and "distal." They simplified the matter and relieved us of the necessity of using long descriptive terms. I have for many years discarded the term "canine" because there seems no good reason for its use; the word "cuspid" describes that tooth as well or better than any other that might be given. While the term "occlusal" might be misleading to one unfamiliar with it, it is merely a matter of preference and a question of what a man is used to. One continues to use the terms that he has learned in the early years of college life. Like Dr. Truman, I do not believe there is any possibility of this body, the International Federation, or any other body finally settling these questions, but it does seem to me that they might arrive at some good results if we had a committee to correct the various dental text-books before being published.

Dr. Godon. I was sorry I could not hear the communication of Dr. Thompson. I sent him a little paper on this question of nomenclature. I have mentioned some of the terms that we use in

the Dental School of Paris. I do not think that the International Dental Federation could make up a nomenclature of all the terms that we use and the decision be accepted everywhere. Such a committee was named at the meeting in Paris in 1889, and all the words they adopted were not accepted everywhere, but some of them were accepted. I think it would be a good plan for the International Dental Federation to make up a dental nomenclature; it would be a very useful thing. I presented some of the terms that we use in the Dental School of Paris, and I believe Black in his report to the World's Columbian Dental Congress accepted some of these terms, as, for instance, the four degrees of caries. There are also some terms on the preparation of the cavities and the names of the edges of the cavity. I have not attempted to read my paper to you on this question, as it is in French. [Dr. Godon's paper will be published in the forthcoming Transactions of the Fourth International Dental Congress.]

I would favor the appointment of a committee by the International Dental Federation to prepare a list of interchangeable terms.

On motion the following resolution was adopted:

Resolved, That an international committee be appointed by the Fédération Dentaire Internationale upon international nomenclature and the preparation of a list of professional terms which shall be interchangeable and translatable into English, German, French, and Spanish; such committee to report at the Fifth International Dental Congress.

On motion of Dr. Thompson this resolution was referred to the committee having the matter in charge, with instructions that it be presented to the congress in general session and its passage recommended.

The subject was passed and the chairman called for the next paper, entitled "Dental Education from the View of Experience," by Dr. James Truman, Philadelphia, Pa., as follows:

Dental Education from the View of Experience.

The following propositions are, in the opinion of the writer, fundamental to a proper realization of ideals in education:

(1) A decided mental tendency, in the individual, in one direction.

(2) This established, training must be to develop these mental tendencies.

(3) Dental education, to be effective, must therefore be developed from these original tendencies, if these are in the direction of its complex character, practical and theoretical.

(4) In this education the *practical* must *precede* the *theoretical*.

Considering these propositions *seriatim* it must be conceded that the mental tendencies of the individual are primarily the most important for the educator to consider. The study of the mental inclinations of youth belongs not alone to the teacher, but is part of the important relations held by parents and guardians. The latter may regard this a difficult problem to solve, belonging more properly to the specialist in psychological manifestations. To reason thus is a fatal error, and one so often made that it has become a very serious evil, forcing young minds in wrong directions and wrecking innumerable lives in vain attempts to acquire, to them, useless knowledge.

The general idea, prevalent not alone among parents but as a part of the general educational thought, is that education to be of value must run along hard and fast lines, and that without variation to meet these special tendencies; in other words, the child is placed, as it were, in a strait-jacket from the time of entering school until the period the diploma is reached. This may be the A.B. of the high school, or of this degree in arts of our universities or colleges. Is it any wonder that the student whose tastes run counter to all this should regard with aversion this iron-clad method? The average teacher, however, holds that to draw out the best in the individual all that is necessary is to force the undeveloped being through the universal educa-

tional mill. It is immaterial to this teacher whether the student is to become a mechanic, an architect, minister, lawyer, doctor, dentist, or journalist, in fact any of the varied and useful occupations that go to make up what we term civilization. To merely name this variety stamps the preliminary work, as usually given, as the weak point in the school training of America. They have a far better idea of education in some parts of continental Europe, in that the training is in the direction of the future work of the student, but while this is an advance, it takes but a limited account of the mental tendencies of the individual. It is true that a thorough classical education is of untold value to any individual, and other things being equal, may give to him power and marked advantage over his less fortunate competitor in the race of life. But this will depend so much on natural tendencies and the subsequent use made of these, that no one can wisely prophesy the future of the individual.

Two prominent and very recent illustrations in this country serve to give point to this by no means original idea. One, a graduate in arts from one of the leading colleges of the country, found his acquirements of no practical value in the active world. His training, good as it was for certain purposes, furnished nothing that would enable him to reach a position consonant with his tastes and necessities. His learning failed to meet the demands of his daily needs, and nothing else offering, he bravely accepted the humble position of a laborer on a railway. The result was that step by step he advanced from this to the position of motorman on an electric street-car. From this, at an early age, to the presidency of the system of street railways in the largest city of the country was the natural result of untiring efforts and original mental training in other directions.

The other began with no such education; in fact his scholastic training was below the average. He started as brakeman on a railroad, and from that, through all grades, became eventually many times a millionaire, a United States senator, and has recently been nominated for the position of vice-president of the United States by one of the great political parties of this country.

The conclusion to be derived from these examples, not at all uncommon, is that the first demonstrates the power of a liberal education when started in the direction of the natural bent of mind in the individual, and the second, that defects in education may be overcome by mental force concentrated on one object.

If then, it be true that a mental tendency in the individual is all-important and must be sought for, when found it becomes of vital importance that the training should be in the direction of these natural tastes. The problem becomes complicated when the individual exhibits no special proclivities, but seems willing to drift along with the world's current. General laws are not for these, however, and the only test for this very large class of young persons is to prove their capacity in some one or more directions. When, however, the tendency is marked, every effort should be made to begin the individual's career properly. If this is in the direction of mechanics, no mistake will be made if, during the impressible period of youth, the muscles are placed in training in schools especially devoted to this work. This experience will be of inestimable value should the youth subsequently prefer the literary training necessary to become a doctor of medicine, minister, or lawyer. Especially will this apply to the surgeon.

Dental education, then, to be effective must be based on an early investigation of the mental tendencies, and those being discovered, the direction which education must take is then plain. Dentistry is a complex study; it begins with the practical and ends with the theoretical, or should so end. From what has already been stated, the necessity for early muscular training in mechanics must be apparent. No other course is left open. Every added year lost in this cultivation is just one year of less ability to overcome mechanical problems.

The idea is often taught, and as often combated, that the theoretical must precede the practical. In other words, the

individual must have a special training before he is supposed to be fitted to begin his work in dentistry. The Association of Dental Faculties says the applicant for the degree of Doctor of Dental Surgery must first show, on matriculating, a certificate of entrance to the third year of a high school. Nothing is said as to the character of the training given in the high school. Our universities demand a fixed standard, easily understood, and very much higher than the ordinary routine of studies. What is the result? Our dental colleges are inundated with educated young men who have been sent by those in authority over them to master a calling, a prerequisite to success in which is a taste at least for mechanical work. Nothing in their previous studies leads to a knowledge of this bent of mind, and the results, therefore, are not always satisfactory.

To decide this question of fitness for the proposed study, the practical must precede the theoretical, and any other course, as far as dentistry is concerned, is simply a great wrong perpetrated in the name of higher education. No greater mistake can be made than to place a youth in a medical college as preliminary to his dental training. The time may come, indeed is fast coming, if not already here in some institutions, of carrying the student of medicine and dentistry *pari passu*. This will doubtless lead to the M.D. degree, but a much longer period of probation will be required than the present four years of training to secure separately either of these degrees, that of M.D. or D.D.S. The experience of dental educators has been—and this has been confirmed in the writer's life-work—that the individual who has passed from the higher schools into those of medicine, and then essays the study of dentistry, fails, with few exceptions, in reaching a high degree of skill. The evidences of the truth of this are among the most painful of the writer's experiences as a teacher in dentistry, and this alone would lead him to enter an earnest protest against this, to him, fatal error in the future proposed education of dentists.

There has been a general impression that the higher preliminary education, if it did not increase ability in the two practical branches of dentistry, would at least enable the student to hold his own, and in other respects make him more valuable in the community. This view is partially borne out by the averages taken in the Dental Department of the University of Pennsylvania. The following table illustrates the average standing of the several classes in prosthetics and operative dentistry from the period when the department accepted students upon a grammar-school certificate to the time when a high-school diploma was required:

Certificate.	Mechanical Dentistry.	Operative Dentistry.
Grammar school.....	76.22	84.82
1st year, high school...	81.19	85.91
2d year, high school...	83.13	80.97
Diploma, high school...	75.47	86.54

While averages are somewhat misleading, yet so far as this goes, as the result in one school, it may be taken as an indication that the boy from the grammar school stands an equal chance with the boy with a high-school diploma in mastering the practical work of dentistry. But it is very evident that the higher education has not improved the high-school boy's ability to meet the difficulties of the practical, more than it has the boy of the lower school. It, however, does show that the higher preliminary training enables the one who has it to hold his own in the realm of the practical, and will give him an immense advantage in acquiring the collateral branches peculiar to medicine.

In conclusion, dental education must be first based on mental tendencies, and these proved, then the education should begin with manual-training work. It is immaterial where this is secured. From this, the practical side of dentistry, the prosthetic must be conquered. This will furnish the foundation for the operative branch, and the two constitute the necessary practical basis for the attainment of success in the future professional life-work of the individual. It must, however, never be forgotten that the old age

of manual dexterity begins with maturity, and skill, to be of value and permanent, must be acquired while the mind and the hands are in the impressive period of youth.

Discussion.

Dr. H. A. Smith, Cincinnati, O. Dr. Truman has given us an interesting paper. Doubtless everyone will agree with him in his main contention, that since dentistry is so largely manipulative all persons seeking entrance to our colleges should show a fondness for or a degree of ability in handicraft. Just how, when, or where this test should be made the essayist does not inform us. Experience shows that parents cannot give a reliable opinion as to their son's fitness to pursue dentistry. A course in the technical school would be out of the question to the majority who apply. Even the old plan of first serving a term in the dentist's laboratory was quite unsatisfactory. As the matter stands today the experienced, able dental teacher is likely to be the best judge of one's fitness to enter upon the study of dentistry.

Dr. Truman has presented some suggestive statistics bearing upon the question of fitness, both natural and acquired, for the study of dentistry. If ultimately it can be shown that students with less education than obtains in a full high-school course excel in prosthetic dentistry, some of us perhaps will have to revise our views in reference to the right educational standard for admission to our dental colleges. Statistics, especially of the kind Dr. Truman gives, are often misleading, but if a systematic, concerted effort was made by our dental colleges to collect statistics bearing upon such subjects as are being discussed before this section today, much aid would be given in the direction of the right education of dentists.

Dr. William H. Trueman, Philadelphia, Pa. This question of higher education is very fascinating. It has become a fad. How far it will prove a practical benefit is a serious question. Undoubtedly, a good mental endowment should be possessed by all who seek to enter the more exacting professions. They need, first, sufficient knowledge and sufficient mental training to enable them to understand and appreciate the instruction given in the professional schools. Secondly, and beyond this, they should have sufficient general knowledge to uphold the dignity of their calling. Now, this latter may be carried so far as to unfit one for his chosen vocation. The time comes when the muscles cannot be trained and educated so easily as in early life, and this, to a dentist, is a serious handicap—for to him manual dexterity is a requisite to success. Higher education has entered the dental schools. The curriculum has been so greatly extended that post-graduate schools are springing up all over the land to teach dental graduates practical dentistry. So much time is taken up with teaching prospective dentists the things they ought to know, but have no use for, that the practical side—the things absolutely essential to his daily work—are neglected. Higher education, preparatory and professional, so far as dentistry is concerned, is so recent that we cannot yet judge its results. When we consider that life is short, it hardly seems wise to compel one to defer entering on its work seriously until it is half spent, as seems to be the trend at the present time, unless it can be shown that better results warrant the sacrifice.

Dr. Henry W. Morgan, Nashville, Tenn. I have been very much delighted and greatly interested in this paper and am glad to indorse most of it. I wish Dr. Truman would change the phrase "practical dentistry" to the expression "the art side of dentistry." The sense in which the word practical has for so long been used leads one to think it refers to the work done for the patient at the chair side, while this is not what Dr. Truman means, if I understand it. The art side of dentistry certainly has been neglected in the teaching of many institutions. I believe with Dr. Truman that the training in the two should be carried on *pari passu*. The student should be made to feel that he is doing something from the very first, and not merely that

he is getting a theoretical knowledge of what he will have to do in the future.

The reference to the gentleman in the paper who started out with a fine education in the arts, failed utterly in his undertaking and went into the street railroad business, later to become the road's president, reminds me of two dental students in my own experience. One was a college graduate, in personal appearance, dignity of character, and general bearing, all that seemed necessary to make up the ideal student. But just here let me say that the record a man makes in a dental college is no indication of what he will make his professional career. This man graduated second in his class but failed utterly in his profession, and in less than two years had made an application for clerkship in a packing house of a Western state. The other student was not so well prepared and barely got his degree. He seemed an indifferent student, content with only a grade that would pass him, with nothing about him to lead to an expectation of success, and yet about the time the first man was seeking a clerkship the second was found to own his home and office, and had won the confidence of the people in the community in which he resided. As a dentist the man who was barely able to get his degree had made a grand success so far as professional career was concerned.

Someone in the discussion of this paper has asked, Who shall decide? If the boy himself is not able to answer that question then nobody under the sun can answer it for him. We have seen many wrecks where attempts have been made to make something out of a boy who is entirely unfitted for the occupation chosen. I graduated in medicine first and have always contended that it was the one mistake in my dental education. My medical training should have come after I became a dentist.

Dr. Chas. Godon, Paris, France. I am pleased to add my indorsement to all Dr. Truman has said about dental education. In this education the practical must precede the theoretical. That is the basis at the Dental School of Paris. The student commences with manual training. When making up our program Sir Michael Foster said the time for a man to acquire manual dexterity was when he was young. We must begin very soon. I am pleased that we have that method in our country, and not only in dental education but in general education the same idea begins to prevail. Only last year a report was made by the rector of the University of Paris in which it was stated that the young man must be trained as a woodworker and an ironworker at the same time he takes his university course. This was approved and I think will soon go into effect. I have been informed by the Commission of Public Education that after October 1904 they will require that dental students take a two-year course in manual training before entering the dental school. They have done this because they believe that practical training should precede theoretical studies. I approve absolutely the principles of Dr. Truman on education.

Dr. Truman W. Brophy, Chicago, Ill. While Professor Truman was reading his paper, in speaking of the manipulative skill that must necessarily be acquired when young, I remembered some of the scenes that impressed me when I rambled over Europe years ago, and the place that affected me most was that of Peter the Great, of Russia. When visiting the city of St. Petersburg the tourist is always taken to his room and shown the pieces of mechanism that he made—machinery of wood and iron; almost all the metals are used in the machinery that wonderful man made with his own hands. That he might teach his people the best in mechanics he even went to Holland to learn shipbuilding. I believe that Peter the Great would never have figured in the history of the world as he did had it not been for his mechanical skill. Engineering is only a high development of the skill which comes through manual training. The Massachusetts School of Technology furnishes a most striking example of what men filling the highest places in the United States government can do with their hands. Too much attention cannot be paid to the subject. I

think possibly that what I have said on the subject has been due in a measure to what Dr. Truman said many years ago when he was the master and I the boy in school, and had it not been for that kind of teaching in those days, away back in 1870, I doubt if I would ever have accomplished much in manipulative skill. I believe that the high-school training, and university training, while a thing of inestimable value, does not fit the young man in the highest sense for the dental profession. I hold that the students of the future should enter the dental schools as well prepared as we would have them, and when we request that they get this manual training it will guide the members of the profession. The dentists of the world will tell the young men that they must have this kind of training, the young man who has not had this training will get it and he will know how to use the instruments when they are placed in his hands, and instead of pushing the file backward he will draw it forward. I was pleased with Dr. Truman's impressing upon us the importance of that. What is the use of high-school training unless we can get with it manual training? If he has not the manual training, as a dental student he will be a failure.

The subject was passed, and the next order of business as announced by the chairman was a paper on educational standards, by Dr. Chas. Godon, Paris, France, entitled "Communication à la Commission d'Enseignement."

[This paper will be printed in the forthcoming Transactions of the Fourth International Dental Congress.]

Dr. Godon. Preliminary dental education in France will be modified after this year. The requirement will be a preliminary manual-training course. That will mean that the student, after he has obtained his high-school certificate, will have to take up a systematic course in manual training at a dentist's or at a dental school giving courses in chemistry, physics, mechanics, and metallurgy before he is admitted to the three-year regular course in the dental school. That will give him a five-year course. The examinations will be modified also on the technical side.

We have asked also of the authorities in France that the title given the graduates of the dental school be Doctor of Dental Surgery, as you have it in this country, and I think if this proposition was adopted that it would put your diploma and ours on a similar basis.

Another thing is the question of the scientific degree. We have in the universities of France what we call the scientific diploma. These diplomas obtain for the pharmaceutical course. He who practices pharmacy is called a *pharmacien,* but the higher degree is that of Doctor in Pharmacy. I have given in the paper I presented here a *résumé* of that question. I do not know whether these diplomas are given in your universities, but I feel there must be a difference in degree between the man who wants to practice and the man who wants to do scientific work.

Dr. Truman. It has been a great gratification to me to know of the advance and progress dentistry is making in France. I trust there will in a very short time be such an advance in this country. From present indications here I am very much discouraged in regard to dental education. I feel that the retrogression witnessed in the United States will seriously compromise us in the estimation of the world.

In Europe (Germany, for example) they have divided the people into certain classes, educating them according to the bent of the individual, but in Germany they do not, it seems to me, lead up to the higher standard as they appear to be doing in France. I do not believe it is impossible to know how the individual would need to be educated. The boys and girls do not pretend to know; it is for somebody else to decide that question. The time will come when we will have some standard of work, when we will be enabled to take these young people and lead them in the right direction.

Dr. A. W. Harlan, New York, N. Y. The evidence of the interest that the governments of the world are taking in

the training of dentists is being presented to us. In the last ten or a dozen years nearly all high schools in the United States have established manual training; and now France and Germany are insisting that that should be a part of the curriculum. It gives the boy the manual training at the time when he most needs it, as was pointed out by Dr. Truman's paper, in which he laid great stress on the need of practical before theoretical training. We draw many of our students from the agricultural districts, where they now have the steam plow and other modern machinery, so that even farmer boys must know something of mechanics. If they have the training they get in high schools they have a pretty good foundation to begin the study of a profession.

Dr. J. J. Rojo, Mexico City, Mexico. In my country, in the "preparatory school," which it is considered essential to pass before the students enter any professional school, it is necessary to study mathematics, physics, mechanics, cosmography, and drawing, and to my belief that gives the student a knowledge of the requirements of mechanics. As I understand it, the idea in both Europe and America is that the dental student must have a good preparatory mechanical training, and in Mexico that is perfectly recognized and understood.

The next paper on the program was by Dr. A. W. Harlan, New York, entitled "Dental Literature," as follows:

Dental Literature.

The subject of this paper is large enough for a volume, and the few thoughts which I shall present are simply to treat the subject in a manner different from that in which it has been presented before.

From the earliest ages, some sort of record has been made of the thoughts and discoveries of members of our profession, and at times such records have been made by those who were not of us, and were not even attached to the profession. If we look over the pamphlets and printed books from the fourteenth century to the present day, we find but meager details of the facts then known.

I would therefore suggest that the best method of studying the literature of the profession is to divide it into periods. Before going farther, I would define what I mean by dental literature. "It is the expression of the concrete basis of observed, collected, verified facts, with the necessary deductions to enable the reader to comprehend it, and couched in a language or manner so simple that it may be easily understood."

Before the Christian era (the first period) there is comparatively nothing that is worth recording. From the time of Christ up to the eighteenth century we have such a small showing that I would denominate that as the second period in the history of dentistry. What have we found during that period? No journals, no societies—only a few rambling notices of events which did not foretell even the beginning of societies—simply the observations of one man, too often not clearly expressed. The few books which were produced before 1800 may be found in C. G. Crowley's "Bibliography," but as Crowley was not a dentist many things appear in that volume which can in no sense be considered as of strictly dental origin.

In the translation of F. Maury's work there is an attempt to give a list of dental works and periodicals. "The History of Dental and Oral Science in America," by J. E. Dexter, 1876, has a meager list of books, but it has a complete list of periodicals published in the United States of America, up to that date. In France, England, Holland, Germany, and Italy many essays and monographs have been printed by dentists before 1700, but unfortunately many of them are in the nature of pamphlets for popular distribution. A few are theses for a doctorate, and some are descriptive of methods of practice intended to serve as guides for other practitioners. It cannot be denied that a free and wholly scientific desire to instruct and improve his fellow-man in a professional way did not seize the spirit of the dentist in any

country much before the year 1760. After that date the writings of the educated dentist became more valuable, as they delineated methods of practice, discovered new facts in anatomy and pathology, and up to the period of the establishment of the monthly journal, in 1839, pamphlets were all the rage. This was true in other countries as well as in the United States of America. In the early periods before 1760, the majority of the practitioners were ignorant even of the scanty medical and surgical knowledge of the times. It is true that here and there may be found a writer of education, general and special, but too many of the brochures display a superficial knowledge of the scientific status of the times.

If you would seek to obtain a history of dental literature, you will have to gain access to the books written between 1750 and the present day. The late Dr. Patrick of Belleville, Illinois, attempted to outline a history of dental literature in periods, but he did not live to finish his task. Many of the works written in the years included between 1700 and 1800 have not been translated into English. Some of these have appeared in French and German, and a few have been written in Latin. It can be said that more works written by English-speaking authors have been translated into French, German, Dutch, and other languages since 1800, than all others combined. This is due perhaps to the fact that dental journals and dental societies have been more numerous in the United States of America and England than in other countries. The secrets of the operating room have been disclosed more rapidly than in some countries where a general diffusion of scientific and practical knowledge was not obtainable through books and journals.

We may date the third period of dental literature, therefore, from the date when societies, colleges, and journals were established. All of these tremendous forces contributed to the dissemination of real scientific knowledge; authors were encouraged to write books; the rapid accessions to the profession from the establishment of all these engines of advancement furnished a sale for those works, and many were stimulated to write, for by so doing they became self-educated.

If you will look over the transactions of societies during the years from 1840 to 1880, or the files of the dental journals, or the lists of those who received honorary degrees during that period, you will see that many of the authors of papers and books had, by their studies and experiments, deserved such honors. The easy entrance to the profession caused many men to adopt it—illiterate but ambitious; so the profession was soon crowded with them, as may be seen by reading their productions. The editors of journals in many instances were not qualified to judge of the literary merits of a short paper, and indeed they were only too anxious to fill their pages to be too severely critical, if there was a good practical idea in a page of manuscript. You may conclude that much which the patient reader will have to wade through is of little value. Look at Taft's "Index of Dental Literature," to convince yourself of this fact. The pages of the *American Journal of Dental Science,* the *Dental News Letter,* the *Dental Register,* and other journals of that period, teem with the most elementary and unscientific matter, from 1840 to 1860. About that time new blood began to be infused, better-educated men wrote more frequently, the air was full of invention and discovery, and the literary quality of the productions was improved; textbooks and original works on truly scientific subjects began to multiply in this and other countries, through the influence of such men as Owen, Tomes, Heath, Salter, Coleman, and Hulme in England; Robin, Magitot, Rottenstein, Legros, Vergne, and others in France; Waldeyer, Wedl, Brück, Zsigmondi, and Suersen in German-speaking countries; and Harris, Taft, Arthur, Richardson, Watt, Garretson, and a host of others in the United States of America. We began then to find, not exactly a plethora of books, but a sufficient number so that the students in colleges could be taught and be thoroughly grounded in the fun-

damentals, as well as in advanced professional knowledge.

In all countries journals multiplied, colleges were established, laws governing the exercise of the right to practice were passed, medical congresses established sections of odontology. The dental congress, international in character, was evolved, and now it is a rare thing to find that a dentist is not acquainted with the newest facts in science or practice, no matter where he is located. This is all due to the unstinted development of dental literature and the wide circulation it obtains throughout the civilized world. There is scarcely a country of one-half million inhabitants where there is not already established a dental periodical of some sort, and you will not find a dentist in the most obscure hamlet in any country who does not possess at least a catalog of some dental dealer descriptive of the latest method of producing anesthesia or the baking of a porcelain inlay.

In this very imperfect survey of dental literature, I have only attempted to show some of the reasons for its growth, the immense value it must be to the practitioner, and to say that there can be no limit to the usefulness and value of books and periodicals when carefully written, carefully edited, and conceived in a spirit of broad conservatism added to an exact and definite knowledge of the subject portrayed.

Discussion.

Dr. A. H. Thompson, Topeka, Kan. I was very much interested in this paper. Such statistics are very valuable. The prehistoric literature of our profession is of considerable interest, as shown by one of our foreign friends whose exhibit is in the hallway, but of course is of interest only in a curious way. We cannot always presume that everything we have is new. While our literature has improved in quantity I regret that it has not improved in quality, as shown by our journals of the present day. This is very discouraging to the student. We would like to see an improvement, but it seems to me there is no improvement in the last fifty years. The old *American Journal of Dental Science* contained articles better written than those of today. The quality has not improved as it should have done. The writers of today do not study our literature as they should. They bring out as new, ideas that have been passed on years ago. The history of the evolution of our literature is very interesting. The text-books are of better quality than the journals, but even these show a lack of knowledge of what has gone before that is very injurious to the student. All writers should aim to improve the quality of their work, and this paper should tend to a betterment of the literature of the day.

Dr. James Truman, Philadelphia, Pa. I really cannot let my friend's statement go by without objection—that the journals of today are not as good as they were forty or fifty years ago. We certainly have advanced. The better journals (and I am not speaking of those commercial journals that are mediums for advertisements) contain a literature very worthy to be honored. I am speaking of the average papers. I know there is much we are obliged to publish that is of no especial value, but when the work of the present moment is taken as a whole we are in an entirely different age from that of fifty years ago. I do not like to hear members of the dental profession say that there is nothing equal to the old journal that came out with its long lists of translations. Let us be just. Men of science in the dental profession are doing excellent work. The papers that came to me as chairman of the Committee on Prize Essays I think have never been excelled. Take, for instance, Dr. Röse's paper, "Pathology of Lime Salts in Nutrition." There is nothing published that gives a better idea of long and patient endeavor, of four or five years' careful and painstaking research to illustrate a point. Then there are Professor Miller's paper and two or three others. Those who attend regularly the national and local meetings of this country know that the literature is far in advance of that of any other period. Take the text-books—why, there is nothing to compare with them in the past.

It would perhaps be out of place to name these, but the students of 1850 will recall the text-books of that period, and will repudiate the idea that the literature of that time was better than this.

Dr. WILLIAM H. TRUEMAN, Philadelphia, Pa. About 1768 a distinguished London dentist, Thomas Berdmore, wrote a treatise upon "The Disorders and Deformities of the Teeth and Gums," and a praiseworthy work it is, except for a few misleading lines in the preface. Excusing himself for avoiding quotations he says, "I could have only quoted a few French authors who have written *to make their names known*, and one or two English who have translated very injudiciously." He would have us understand by this that at the time he wrote, dental literature did not amount to much. This work was republished in 1844 by the American Association of Dental Surgeons as part of the American Library of Dental Science, and the profession in this country seems to have "caught on" to this misstatement and are fond of repeating it. The old dental pioneers are usually credited with a well-thumbed copy of "Hunter on the Teeth," the only dental work extant a hundred years ago, and the reminiscences now and again appearing in the dental journals invariably recite the stereotyped phrase, "There were very few dental books when they began practice, 'way back in the thirties or forties." Now when the American Association of Dental Surgeons proposed, about 1840, to republish some of the old dental works, an English dentist very kindly placed at their disposal his dental library of some one hundred separate titles from which to make selection. It was a choice collection, containing many of the more notable works published up to that time; it was, however, far, very far, from being complete. So you see dental books were not so very scarce fifty or sixty years ago. As to the character of these old dental works, I refer you to that of Eustachius, published in 1563, to that of Hemard, dated a few years later, to the works of Fauchard, Mouton, Lecluse, Bourdet, Jourdain, Gariot, and Joseph Fox, as samples of the dental literature extant a hundred years ago.

It is true, prior to 1839 there were no dental journals. There were, however, a large number of medical and scientific journals through which practitioners of dental surgery made known to the world their observations and discoveries, and they were freely used. I have recently photographed a collection of daily newspapers published more than a century ago, containing many items of dental interest that would now be sent to dental journals.

Dental literature of the past is worthy of far more attention than it has yet received. The more we look into it the more we find, and the more we find to appreciate and admire in those who made it. The time was when its study would have been of much profit. Take, for instance, the use of arsenic for devitalizing exposed pulps. What a wonderful help it has been of itself, and by that which it has prompted, in tooth-saving. Had it been generally known to dental surgeons that this potent remedy was in constant use by the old Arabian physicians of more than a thousand years ago, as a last resort in persistent tooth-pain, would not this fact have suggested its use in conservative dentistry long before the time of John Spooner? Fauchard, in the first edition of his work, notes the invention of a machine for separating teeth and preparing cavities of decay for filling; later, Jourdain and Bourdet discuss its advantages and its failings; these works, with their useful suggestion, became "back numbers;" they were forgotten, and the advent of the indispensable dental engine was delayed more than a century. Mouton, in 1746, suggested the gold shell crown for restoring to usefulness badly broken-down teeth. He even suggested that when these are placed upon conspicuous front teeth they should be enameled so as to resemble in color the teeth on either side. While this suggestion was not entirely forgotten, it was but little used until a comparatively few years ago. It is not just to compare the work of these old writers with that of today, or to disparage their theories or

their methods because they seem in the light of the present, vague or crude.

For the early dental journals I have a high regard. The first twenty volumes of the *American Journal of Dental Science,* in my judgment, stand today without a peer. The journal was practical in the fullest sense of the word. Its contents, for the most part, were well written, they were helpful to its readers, and thoroughly up to date. Its editors were earnest, thoughtful, scholarly men; they gave to the world a dignified professional journal, and set up a standard of which we have every reason to be proud. There were other journals of which so much cannot be said, notwithstanding, however, they doubtless served a useful purpose, and have helped in the upbuilding of the profession. When we remember that our professional brethren are many, that they have varied tastes and varied needs, it seems a good thing that there are so many dental journals, and that they are not all alike. They are all doing a good work, and we wish them God-speed.

Dr. Harlan (closing the discussion). I have a copy of Fauchard and I do not underestimate its value and his knowledge of the times. But I said that from that period dated a practically better knowledge than any previous period. The knowledge his predecessors possessed was not demonstrated, for the books were not translated, and many of them were written in Latin and were not even translated into French; 1789 to 1860 gave us many articles of absolute merit; but I was taking a survey of all that we called dental literature. In many of the dental journals there were articles that could not gain entrance in a dental journal now, unless it was one of those we have already mentioned as advertising mediums, and while we are numerically much stronger, the dental literature produced from 1860 to the present time is of greater value to the world through the essence of what it presents than all that was presented prior to that time. I do not want to decry or underestimate the work that was done by these men; but of all the works Dr. Trueman mentioned none was published in a larger edition than from 100 to 150 copies, therefore they never had a wide circulation, and though of extreme value they had no effect upon the formation of the dental thought of the time. Many of these works I have collected during my trips to Europe and I am familiar with them and many others, but it was to give a kind of *résumé* of the three periods that I tried to make clear in my paper, not to undervalue that which was good.

On motion the following paper by Dr. Louis Ottofy, Manila, P. I., "History of Dentistry in the Philippine Islands," was read by title and ordered to be incorporated in the proceedings:

History of Dentistry in the Philippine Islands.

The history of dentistry in the Philippine Islands is very brief. In 1900 I wrote a history of dental legislation* in which I covered the field to that date. A brief *résumé* of that article shows that prior to 1853 some legislation relating to dentists had been enacted, but as dentists were included with phlebotomists and midwives, and as there were no dentists in practice here at that time, I apprehend that the term dentist was included in the following way: It was customary with Spain to issue "royal decrees" and "royal orders" for her colonies. These orders and decrees were practically copies of laws then in force in Spain; and in case some regulation as to midwives, for instance, was necessary, the specific decree or order was sent out to the governors of the various colonies as copied from the home laws. Thus a regulation was put in force here, governing dentists, before any were engaged in that calling.

The Royal Decree of September 22, 1853, provided that in order to practice dentistry it was required that one should prove that he had practiced at least three years under the tutelage of a practitioner who was designated by the term

* *Dental Review*, vol. xiv, August 1900, p. 579.

"professor." Those who were able to prove this could enter the University, and after passing an examination and paying a fee, were admitted to practice. The next enactment was the Royal Decree of June 4, 1875, which practically embodied all the essential features of the law as it was in force at the time of the American occupation. It provided, briefly: Dentistry constitutes a profession under the name of dental surgery; special certificate necessary; requires dentists to devote themselves only to the diseases of the mouth and teeth; the possession of certain theoretical and practical knowledge must be shown; three medical and two dental practitioners compose the board of examiners; certificate of dental surgeon issued to successful candidates; examination fee, fifty pesetas, certificate fee, two hundred pesetas; dentists practicing, if considered worthy, may continue.

A Royal Order of May 28, 1876, one of December 6, 1881, and one of February 11, 1886, modify the previously issued decrees in minor details, as to method of enforcement, etc., and require all to register, while another order of May 1, 1890, places the examination under the charge of the rector of the University. Under the military government of the United States an order was issued in August 1899 requiring all dentists to register with the Board of Health, and this was the condition up to the passage of the present law, on January 10, 1903, which is hereafter referred to.

I am unable to secure any infallible data in regard to the practice of dentistry until the time the natives were brought under the influence of foreign dental practitioners. I invite your attention to an article signed "A Returned Soldier," published in a dental journal,* in which the soldier describes and illustrates primitive dentistry, and some of the tools used. I am unable to verify the correctness of the statements made, but in any event the practice and the instruments are evidently based on recent methods of, and modern appliances used by, dentists. In another magazine* one signing himself "A Regular," describes and illustrates some of the practices of the "head-hunters" of Mindanao, showing the disfiguring practices of those people, as well as the tools used for filling the teeth, inserting pearls, etc. I am also unable to confirm the statements made in that article.

Like all semi-civilized people, the Filipinos also possessed some methods for relieving pain. One superstition was that if a piece of bamboo was whittled to a sharp point, ignited and charred, and then thrust into the skin on some part of the body, preferably the hand, the pain would cease. The old Chinese practice of "extracting the worms" from the teeth by holding the open mouth over a steaming vessel of hot water, was also practiced. From the shell of the cocoanut they also obtained substances giving relief. Into a half shell some water was placed and heated from underneath, thus practically boiling the water in the shell. By this process some principle was extracted from the shell, resembling creasote; this was then placed in the cavity. From careful inquiry from men who have lived here all their lives, and much of the time in the provinces, I am unable to gather anything reliable as to any practice worthy of note on this point, and it seems to me certain that practically nothing was done from a dental standpoint until about 1860.

In that year, or 1861, an American dentist, named Pettengill, visited the Islands, and entered into a lucrative practice among the few foreigners who were engaged in business in Manila; he was also patronized by the better-educated and wealthy natives. He employed as an assistant and student a native, José Arévalo, now eighty years of age, and justly entitled to be known as the "father of dentistry" in the Philippines. Since then his sons, a daughter, grandson, and other relatives have entered the profes-

* *Dental Brief*, vol. vii, February 1902, p. 318.

* *Dental Review*, vol. xviii, April 1904, p. 318.

sion. At the present time five of that family name are practicing in these Islands. Pettengill left and said that he would return, leaving his chair and instruments with Señor Arévalo, who continued in practice. Some time later Pettengill returned, and soon drew a handsome prize in the lottery, after which he disappeared from the Islands. With that beginning, Arévalo entered into practice, and did the best he could. A Frenchman, Mons. Petlere, also practiced here for a while. Dr. Melanchthon Stout, formerly of Chicago, now of Marlinton, West Virginia, visited the Islands some thirty years ago, and Dr. Eastlake, who practiced in Japan, is also said to have made visits to the Islands about that time, while others from the China coast made occasional visits to Manila, sometimes also going to Iloilo and Cebú. In 1888 a Cuban dentist, Señor Villa Raza, and about the same time Señor Conrado Martel Arandes, and other Spanish dentists, located in Manila. From the nucleus of Pettengill's visit, and with what could be gathered from other Americans and Spaniards, the native dentists picked up what they could. One Spanish lady and one of the native dentists tried to improve their education by a visit to Japan, while one native is a graduate of one of the schools in Philadelphia. Under these circumstances it is no wonder that but little progress has been made, and such as it is was made under difficulties.

Prior to the American occupation these men secured some medical instruction in the College of San José, a medical school affiliated with the University of Santo Tomás. This led to a certificate of a "Cirujano Ministrante" (Ministering Surgeon) at the end of a two years' course. For four or five years preceding the insurrection of 1896 (soon after which the school was closed for several years) some attempt was made to teach extracting, treatment of teeth, etc., but no effort at the establishment of a regular dental course was ever made. Nor has there ever been any dental journal published here, or any regular dental supply house established.

When the Americans entered Manila in 1898 there were not to exceed twelve dentists practicing in the Islands. With the exception of one American and a few Spaniards they were all Filipinos, and nearly all of them were located in Manila. By reason of the disturbed conditions prior to the capitulation of the city, August 13, 1898, the only American dentist located in Manila had taken refuge in Hong-Kong, and therefore no American dentists were engaged in practice in Manila in September 1898. With the volunteer troops several dentists came out, and at least one was assigned by the military authorities to the troops; this was done by a detail to the Hospital Corps, and by permission being granted to the man so detailed to render dental services to the soldiers. Since then, not to exceed twenty American dentists have located in the Islands at various times, of whom not more than six are still in practice in the Islands.

On February 4, 1900, the Manila Dental Society was organized with a charter membership list of nine. During that year the society met with fair regularity and several papers were read and discussed. The unsettled condition of the Islands as well as the constantly changing personnel of the profession and the desire to confine the membership to those who understood English, resulted in apathy, which continued during the years 1901, 1902, and 1903. At the annual meeting in February 1904, and since then, new members having been admitted, the drawback as regards the language is partially removed, Americans having acquired some knowledge of Spanish, while some of the Filipinos have become acquainted with English. The society has since that time met regularly, and several interesting papers have been read and discussed. Probably the first paper ever read in the Spanish language in the Islands by a native was read at the meeting in April of this year. The Filipinos are eager to learn, and the usefulness of the society henceforth seems assured.

In the fall of 1900 the Manila Dental College was organized, modeled on the

basis of the advanced position of dental education in the United States. After one successful session the school had to be abandoned. The course laid out was entirely too advanced for Filipinos, while the changing character of the American population would have prevented the drawing of classes from among the Americans. Furthermore, by reason of the prevailing insurrection at that time, the conditions were unfavorable for the maintenance and growth of a dental school, or for that matter of any school, except those long established and connected with the monastic orders. Six or seven matriculated, of whom three American gentlemen, all connected with the Hospital Corps of the United States army, completed the full course. At least two of these gentlemen have since then completed their dental education in the United States, and both of them with honors.

During the summer and fall of 1901, the dentists appointed for the United States army, under the act of February 2d of that year, began to arrive in the Islands, and a base dental hospital and supply depot was established in connection with the First Reserve (military) Hospital in Manila. The members of the dental corps in the Islands until recently averaged about fifteen men, distributed at the various military posts in the Islands, and visiting outlying districts where troops are quartered. I am unable to give any report of the extensive and valuable services of the corps, and presume that such information will reach the congress through other sources.

An Act to Regulate the Practice of Dentistry in the Philippine Islands was passed by the Philippine Commission on January 10, 1903, a copy of which in English and Spanish I have transmitted to the Section on Dental Legislation of this congress. Under this act a number of members of the Army Dental Corps have registered, some of whom have since been transferred to the United States, while those still remaining, by the nature of their duties cannot be reckoned as resident dentists of the Islands. The register of the dental board contains a total of less than forty-five names (inclusive of temporary licenses and undergraduates) of whom not to exceed twenty-five are engaged in the *bona fide* practice of dentistry. Of this number nineteen are located in Manila, and on June 19, 1904, an effort was made to secure a group photograph of all those engaged in practice in this city, with the result that fifteen out of a possible nineteen responded to the call. I take pleasure in transmitting with this paper a copy of the photograph, which is representative. In the center of the foreground is José Arévalo, above referred to, as the "father of dentistry" in the Philippines, who is now eighty years of age, and retired. The group gives some idea of the polygenic population in the Orient. There are seven Filipinos, five Spaniards, one British subject, and two Americans represented in the group.

While a history deals only with the past, it may not be out of place at this time to look somewhat into the future. It should be remembered that the Philippine Islands have recently passed through a critical period, which has materially affected the economic welfare of the Islands and their inhabitants. The insurrection, which broke out in 1896, was followed by the war with Spain, and succeeded by another insurrection. In the meanwhile the Islands passed through a pestilence of plague and cholera, while the draft animals were decimated by such diseases as surra, glanders, the rinderpest, etc. Nor did the various crops escape unscathed, being often totally destroyed by a plague of locusts, and by various insects attacking the coffee plant and other vegetation. Happily, the Islands are now practically free from these scourges, and very little is now feared, except possibly from the locusts. It is not too optimistic to predict that the Islands are now entering on an era of prosperity.

It has been seen that the number of dentists in proportion to the population, which is over 6,000,000, and of whom many are educated, while a larger number are prosperous (or can be, under normal conditions) is very small. As a

matter of fact, outside of the city of Manila, dentistry is a sealed book, and first of all the general education of people along the lines of dentistry is essential to create a demand for dental services. In another paper which I have contributed to this congress I have conclusively shown that caries and tooth-destruction is just as prevalent here as in the United States and elsewhere. In this large city of Manila, containing as it does a native and Chinese population of about a quarter of a million, there is no place where the poor may get relief except a small free dental clinic which I established last January and have since maintained in connection with St. Luke's Hospital. The mass of the people absolutely know nothing of dentistry.

One of the most important needs of the Islands is the establishment of a dental school, and that is now under consideration. The law is extremely favorable toward native young men who desire to make a beginning in this direction, contemplating a brief course of instruction, looking toward the giving of relief in remote sections of the country, the introduction of simple fillings, and substitution of the teeth when lost. It is believed that a small beginning will have to be made, and the course of instruction increased as the education of the people creates the demand for the higher class of service made possible by the advance made by the profession. Natives thus educated would be enabled to render services within the means of the people, being able to live inexpensively and subsist on less expensive food than foreigners. And in this lies the answer to the question, why there are practically no desirable locations for Americans or foreigners outside of Manila. Aside from this fact, it should be borne in mind that comparatively few foreigners are located in the Islands, that few natives speak Spanish, and that the knowledge of some native dialect is essential to enable one to get along with the people.

I hope in the near future to see such steps inaugurated as will ultimately extend to these people the beneficent advantages accruing from the intelligent exercise of our profession.

(To be continued.)

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

Monthly Meeting, January 1905.

A REGULAR meeting of the First District Dental Society of the State of New York was held Tuesday evening, January 10, 1905, at the Academy of Medicine, No. 17 West Forty-third street, New York city, the president, Dr. Henry D. Hatch, in the chair.

Dr. Goldsmith read the report of the Clinic Committee.

After the reading of a paper by Dr. HERBERT L. WHEELER, entitled "Ethics of the Transitory Summer Practice," the president introduced Dr. F. L. STANTON, who read a paper entitled "Method in Dental Practice."

Dr. WILLIAM B. DUNNING then read a paper entitled "Art and Utility in Filling Operations."

[This paper is printed in full at page 1072 of the present issue of the COSMOS.]

Discussion.

Dr. ARTHUR H. MERRITT. I have been much interested in Dr. Dunning's paper, and especially interested in the subject to which he invites attention, for there is probably no problem which confronts the dentist more frequently, or one requiring better judgment in attempting

its solution, than that one in which the utilitarian in filling operations shall be sacrificed to the esthetic.

The first obligation which is laid upon us, and one which must always receive the first consideration, is the preservation of the teeth; but a second one, and one that is quite as imperative, and often taxing our resources beyond the first, is the accomplishment of this without disfigurement. These two opposing factors are probably most often reconciled in the judicious use of gold. It is its exaggeration rather than its legitimate use which is responsible for the reaction against its employment, for it is true that the public have come to regard its use as vulgar and plebeian, and are willing to lend themselves to almost any expedient to avoid it. This is, of course, extreme, for I believe it may be employed in many instances, even in the anterior teeth, with all due consideration for the esthetic, and with greater satisfaction than with any other material now at hand. It is true that esthetically gold is a poor substitute for enamel, as is all art when compared with nature's perfect handiwork, but it is the best we have to offer, and except in large restorations in the anterior teeth should be used where permanence is the object sought.

Before we can hope to attain our ideals of the esthetic in dentistry, we must have the co-operation of our patients. They must be made to understand that their responsibility in this matter is primal, and that they have been grossly negligent when they present themselves with teeth seriously involved in caries, for after we have given to them our best efforts, and exhausted every resource at our command, we have only emphasized the irreparable nature of their loss. Not until parents learn to realize the duty which they owe to their children in this, and see to it that they receive the care which is so essential to their welfare, shall we be in a fair way of finding a solution to this most vexing problem—a problem which will never be solved by a multiplication of filling material.

As to the use of gold in bicuspids and molars, I have little to add to what the essayist has already said, except to say that it is here, where appearances have not to be so carefully considered, that we find its largest field of usefulness, and that we should let no circumstance which we can control prevent its being used in these teeth.

Amalgam should be limited to inaccessible cavities, and to teeth in the posterior part of the mouth so broken down as to make the employment of gold impossible. This is its legitimate place, and any filling material which will make gold crowns unnecessary, or defer their employment, justifies its existence. There are two things which are responsible for the odium which attaches to this filling material: its employment where it is not indicated, and the careless way in which it is manipulated. When there is given to its use the same care which is given to gold, and it is limited to those cavities where gold cannot be used, it is one of the most useful filling materials which we have. In the use of porcelain I wish only to commend the conservatism which the essayist expresses. Its abuse is already an accomplished fact in the hands of some, and his word of caution is most timely.

One thing more. Dr. Dunning says that circumstances alter cases, especially in dentistry. He is right. What we know should be done, and what circumstances permit us to do, are often two totally different things.

I said that amalgam should be limited to those cavities where it was impossible to make perfect gold fillings. I believe this to be its legitimate place, and that if this rule had always been observed, it would never have fallen into disrepute. But how often are we compelled by circumstances which we cannot control to make amalgam fillings in bicuspids and molars, where only gold is indicated.

I have no doubt that the essayist is right when he says that this is often done through following the line of least resistance, and if it is the operator who has done this to save himself, or allows his patient to do so, when the patient could and should be controlled, then he is culp-

able. But it has been my experience that the cause which is more often responsible for this compromise is that the patient is unwilling to invite the expense which would be incurred by the use of gold. Large restorations in bicuspids and molars can usually be made with amalgam in one-half to one-third the time involved in the use of gold, and with a corresponding decrease in expense, and with patients who are obliged to consider this (and there will always be such patients) we are not only justified in compromising with amalgam, but it is an obligation which we owe to them, though in so doing we know we have not rendered them the highest service. This is only one of the many circumstances which alter cases in dentistry in everyday practice, and make necessary compromises and expedients which in writing a paper to be read before a society such as this we would never think of making.

Dr. Wheeler. I agree with the essayist in his remarks on gold, but I do not agree entirely with his remarks on amalgam, especially those as to amalgam having reached a point that is practically perfect, and what Dr. Black has done. I ask any of you, Do you know any more about it than you did before? Do you know whether it is a chemical mixture or what? Do you know any more about the formulæ? Are the formulæ used by the manufacturers more correct than heretofore? Is the profession better off, or the manufacturer?

What we want to know is what we are using, in amalgam or anything else, and we will never be a profession until we insist on this. While I greatly admire Dr. Black, I think his work is far short of being final, or of any great advantage. The only formulæ he gave to my knowledge were given nearly the same by Flagg ten years previously. I will not say more about amalgam now, because some time I hope to have something definite to say.

I have paid considerable attention to porcelain. It will not do all that is claimed for it, but with the proper material, and care in the fusing and in the cooling, it has a strength that is scarcely ever accredited to it. In cases where I wish to elongate the teeth, I have placed porcelain on the upper and gold on the lower, and I have used the clasp metal, and have had the porcelain tips come down and make pits in the gold in less than a year. As time goes on, in a few years the gold will wear down, and there will not be a scratch on the porcelain.

Dr. Goldsmith. What porcelain was it you used?

Dr. Wheeler. That was the Whiteley. But I think any porcelain could be used for that purpose. I allow my furnace to cool with the inlay. You cannot take porcelain out into the cool atmosphere or it will affect it and make it brittle. It will affect anything vitreous.

The President. Do you apply that only to the last fusing?

Dr. Wheeler. Yes, the last fusing.

A vote of thanks was given to the essayists and the gentlemen who discussed the papers.

Adjournment.

B. C. Nash, *Secretary.*

SIXTH, SEVENTH, AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

Thirty-sixth Annual Convention.

(Continued from page 602.)

THIRD DAY—*Afternoon Session.*

The meeting was called to order at 2 o'clock, Wednesday, October 25, 1904.

After the reading of a paper by Dr. M. D. JEWELL, Richfield Springs, N. Y., on "Food *versus* Function," and one by Dr. H. H. TOMPKINS, on "The Value of a Trained Assistant in the Dental Office,"

The President called on Dr. C. M. DUNNE, Norwich, N. Y., who read a paper on "The Care of the Mouth from the Dentist's Standpoint," as follows:

THE CARE OF THE MOUTH FROM THE DENTIST'S STANDPOINT.

The title of this paper approaches more closely than do most titles the proper work of the dentist.

Clearly the first requisite in order that such service may be intelligently performed is a knowledge of the normal mouth, of the number and position of the teeth, their proper shape and function, and their relations to each other. The knowledge of the mouth should not be confined by the general practitioner to the teeth and gums. He should have a thorough knowledge of any diseased condition that may arise in the mouth. The dentist practicing in the larger cities can more easily do without this knowledge than can the dentist practicing in the smaller towns, as the former can turn these cases over to the oral surgeon and the stomatologist. The dentist should know the normal structure, shape, and condition of the various parts of the mouth, and at least something of their functions.

The knowledge so quickly outlined is really very extensive, and its acquirement is the work of years, but it is essential. Based on this knowledge we may say that a mouth is normal when all the teeth are present in their proper position and in good condition, and when there are no deposits on the teeth or deformities or diseases of the gums.

With this knowledge of the normal mouth as a basis the dentist should make himself familiar with the more common departures from normal which any mouth may present. A mouth may depart from normal in any of six ways. First, by loss of teeth; second, through ravages of decay; third, by malposition of the teeth; fourth, by deposits on the teeth; fifth, by disease or deformities of the gums; sixth, by the condition of the saliva. There are many other conditions, but these are the most important. The dentist should qualify himself to recognize any of these abnormalities, and to deduce four things concerning any one of them: first, the present condition; second, the cause which produced it; third, the consequences, present and future; fourth, the best available means of remedy.

In the daily practice of dentistry this knowledge must span the gap which so often yawns between theory and practice, and reduce itself to working terms. It must answer the question, What shall the dentist do who is to take care of any given set of teeth, or preferably mouth, and how shall he do it? I do not believe any dentist could be so narrowed as to simply fill his patient's teeth and pay no attention to any other pathological condition present. A dentist should doctor the mouth just as a physician does the body and should be able to treat troubles in any part of the body that have their

origin from the teeth and mouth. We are too prone as a profession to refer those conditions to the patient's family physician, and believe me, gentlemen, the general practitioner of medicine is very ignorant regarding any pathological condition of the oral cavity.

The dentist should first inform himself, so far as his powers of observation and reasonable questioning permit, of the temperament and general health of his patient. In most cases, especially with women, this is written so plainly in the face, physique, teeth, and manner of the patient as to be read at a glance. The dentist should make a careful examination of the mouth, not paying too much attention to what the patient may have to say concerning things dental. He should note the position and condition of the teeth, the condition of the gums, what teeth are missing, and what the effect of their loss has been. In a young person whose teeth are irregular, he should examine the bite and try to determine the cause of the malposition. When this has been done, he may note the particulars of what fillings are required, make a diagram of the same, and he will have an intelligent basis from which to take care of that set of teeth.

Unless special considerations prevent, the first step in caring for any mouth is to clean it. Cleanliness must be the basis of all dental operations. This question of putting the mouth in condition for the operation is more easily attained than some dentists suppose. Personally, I am a great believer in giving a new patient some good antiseptic wash, a good powder or paste, and a tooth-brush, and sending him away for a few days, so that he may carry out the first step in caring for his mouth. If the purpose be explained to the patient in intelligent and reasonable terms, it usually meets with ready approval; if it does not, it seems to me that the dentist is within his rights if he refuse to work in a mouth which is a constant source of danger to him and of probable failure to any work he may do. It is useless to put even the finest work in mouths which are habitually unclean. Fillings in such mouths will show recurrent decay, bridge piers will fall, and plates will become foul and unsanitary. Having cleaned the field of operation the dentist will try to put those teeth which remain into condition to give the best service of which they are capable. In inserting fillings, he will try as far as he can to restore the natural outlines of the teeth, especially in relation to the contact points. Proper contact between adjoining teeth is the great preservative of the interproximal gum tissue. The loss of this contour is usually followed by wedging of food between the teeth, the crowding back of the gum, and the forming of a pocket in these spaces. This is only the beginning of a train of ills and discomforts.

When the remaining teeth have been put in good condition the dentist will turn his attention to those which have been lost. Many considerations will come up in this work, but if the abutments are firm and sufficient in number, and the bite warrants, he will probably suggest to the patient that bridge work will be much preferable to partial plate. Should a bridge be installed, the dentist will endeavor to so construct it that it will be self-cleaning, thus preventing collections of food which will become foul. If a partial plate must be made it should be so constructed as to obviate so far as may be the evil effect on the remaining teeth.

In this work, both operative and prosthetic, the dentist will bear in mind the considerations which are due to esthetics. There is rarely if ever excuse for spoiling the appearance of the mouth in order that it may be put in condition for service. With modern appliances and methods it is usually possible, if sufficient pains be taken, to restore both usefulness and appearance. Side by side with this actual work of caring for the mouth and teeth runs another line of work which the conscientious dentist should not be slow to perform. It is the work of advising and educating the patient, and it consumes no small part of the time and energy of every faithful dentist. Nearly every mouth not only requires general care but some special care peculiar to itself. It is our duty to educate each pa-

tient in the use of floss silk, brush, and medicaments, and instruct him concerning the special care his mouth may need to protect certain susceptible places from decay. And, gentlemen, right here I want to say that I am a great believer in mouth-washes, tooth-powders, and tooth-pastes. Too many of us have some preparation that is not pleasant to the patient, and however effective it may be, the average patient will not use it. I believe it is the duty of every dentist to advise his patients to use the most pleasing and effective medicament for cleansing the teeth and mouth that he can find. This I believe to be true, especially with children. It may not be the one containing the most effective antiseptic; you are securing more than that; you are helping the patient to form the habit of caring for his teeth, and it is the continual care of the teeth that makes our operations serviceable. Deposits differ in different mouths and the patient should be shown what means will longest retard their formation in his case. If during a cleaning a scale of tartar be shown him and its origin, location, and effects explained to him in plain words, together with the reason why the teeth should receive attention at certain intervals, whether he suffers pain or not, that patient may be educated into an intelligent and continuous patient. We should inform our patient concerning any serious malocclusion. It is now well known that these irregularities are susceptible of correction until the person has matured and even afterward. The dentist is often the only one who can discover to the patient the relation between irregularity of the teeth and false expression. Surely no information could be more welcome than that which permits the correction of some hateful facial blemish.

We should direct our educational efforts with great energy toward teaching the people the value of the molars, "back teeth," as they call them. There seems to be a general impression that since these teeth are out of sight they are less valuable than the anterior teeth, and many persons who sacrifice to save an incisor will permit a molar to be lost for some comparatively trifling defect, in spite of all the dentist can say. There are far too many mouths where the loss of the molars has wrought havoc to the incisors.

No part of the dentist's educational work is more important than that dealing with the child's mouth. In it lie great possibilities, and it is a regrettable fact, gentlemen, that children are not compelled by law to care for their teeth. Each child is compelled to be vaccinated, and compelled to attend school, but is not compelled to do what is more important to his future health and comfort—attend to his teeth. The world is crowded with pale, puny, and puerile children, whose undeveloped and abnormal state is due to improper mastication of food. Without proper mastication a child's stomach, and in fact all the organs of digestion, are overworked. Assimilation is not properly carried on, and nothing but a sickly, unhealthy child can be the result. I hope to live to see the day when each child will be compelled by law to consult his dentist from the very day he enters school or before, every three or six months, as his dentist demands.

It is strange that with all the great lawmakers and with all the men and women looking forward to the welfare of future generations of this grand and glorious country, this one and the most important thing should be overlooked—the care of children's teeth.

If children's teeth are properly cared for from the beginning, the care of the mouth in future years will be greatly facilitated.

Discussion.

Dr. G. W. Pringle, Niagara Falls, commended the paper very highly. He agreed that one thing lacking in the dental office today was the proper instruction of the patient in regard to the care of the teeth. He suggested the plan of publishing such papers as the essayist's in the literary magazines, for while the dental office is the best place for people to receive such instruction, possibly a greater number could be reached through the literary magazines.

Dr. F. A. Ballachey, Buffalo, said

the essayist did not refer to mastication as one of the means of keeping the mouth clean. He thought that thorough mastication was one of the best methods of keeping the mouth and teeth in a healthy condition. The patient should receive thorough instruction in the proper mastication of food as well as in the care of the mouth.

Dr. R. E. Luther, Batavia, said there was one point in the paper that interested him particularly, which was in reference to the necessity or duty of the dentist to look after the general conditions of the mouth other than merely taking care of the cavities in the teeth. Nearly all dentists had seen, he said, many serious conditions resulting from the interference of the physician with the duties of the dentist, and he thought every dentist should be prepared to look after these general conditions of the mouth, that is, conditions resulting from trouble with the teeth, and the best way of doing that was to educate the people up to such a point that when something went wrong with the teeth they would not consult the physician instead of the dentist. He mentioned as an illustration the case of a lady who had been suffering from an abscess, and the physician induced the suppuration to break on the outside of the face. The case had to be treated by a dentist, and a considerable operation was necessary, as necrosis had set in. He believed this trouble could have been avoided by the patient consulting a dentist instead of a physician in the first place.

Dr. G. W. Cochran, Erie, Pa., mentioned another case of the same character as that instanced by Dr. Luther, illustrating the necessity for educating the people up to the point where they will know when to consult the dentist and not the physician.

Dr. W. W. Coon, Alfred, N. Y., thought dentists were wrong in criticizing the physician for not sending patients to the dentist. He believed as a rule that physicians were very thoughtful of this, and referred a great many more cases to dentists than dentists did to physicians. He thought dentists should practice more reciprocity and less criticism along this line.

Dr. J. W. Beach, Buffalo, said the paper reminded him of a paper he read some time ago in the old *American Journal of Dental Science* by Dr. Parmly of New York, in which the subject was discussed in about the manner as the paper just read, calling attention to the care of the mouth and teeth, and recommending antiseptics to keep the mouth in a clean, healthy condition. The speaker thought there was no question that, if dentists paid proper attention to the care of the mouth and instructed their patients properly, they could control decay of the teeth and also prevent many disease conditions concomitant with the diseases of the mouth and teeth.

Dr. Dunne, in closing the discussion, said he realized the fact that the subject demanded a great deal more work than he had put on it. His original intention had been to confine the paper to the care of children's teeth, as he believed the profession was very weak in that particular field. It was often the case, he thought, that the dentist would lose patience with children the first time they came to the office, with the result that children developed a sense of fear of the dentist on their first visit, and were very reluctant to visit him again.

He wished to add just one suggestion with regard to the dentist and physician working hand in hand. The average dentist he believed to be conscientious in the treatment of his patients, and when meeting with disturbances he does not understand, in nearly all cases refers the patient to the family physician. He thought, however, on the other hand that physicians were very much opposed to referring patients to the dentist for the purpose of having the mouth and teeth placed in a healthy condition when the patient fails to readily respond to the treatment. As a result of this he believed that many conditions resulting from diseased teeth were treated by physicians simply because they did not feel disposed to refer the patient to the dentist. He did not believe that the medical profession was treating the dental profes-

sion properly along these lines. As an example of this, he said that many of us had seen patients treated by the month for neuralgia without any beneficial result, and all the patient needed was a visit to the dentist to have the teeth looked after.

The subject was passed, and Dr. F. L. Sibley of Rochester read a paper on "Electricity as a Remedy," which was discussed by Drs. T. C. Phillips, Buffalo, F. W. Low, Buffalo, and H. L. Belcher, Buffalo.

Dr. F. W. Proseus, Rochester, then read a communication with regard to the dental law in New York, which was discussed at length by the members of the convention.

Dr. H. B. Huver, Buffalo, moved that a vote of thanks be extended the business committee for the excellent program presented at this meeting.

The motion was carried.

Dr. C. S. Butler moved that the thanks of the convention be extended to Drs. Proseus and Meisburger for their work with regard to unethical practitioners.

The motion was carried.

There being no other business before the convention, motion was made and carried to adjourn until the next union meeting.

Clinics.

Dr. G. F. Woodbury, Cleveland, Ohio. "High-Fusing Porcelain in Inlay Work." Dr. Woodbury's clinic consisted of a high-fusing porcelain inlay in an upper central incisor, labial surface, near the gingival margin of the gum.

Dr. George N. Wasser, Cleveland, Ohio. "Porcelain Inlay (high-fusing)." Dr. Wasser's clinic consisted of putting a porcelain inlay in the mesial side of an upper right lateral incisor, burnishing the matrix into the cavity, and using high-fusing porcelain.

Dr. T. E. Newman, Buffalo. "Backing Tooth for Bridge Work." Dr. Newman demonstrated the backing up of a tooth for a Richmond crown or for bridge work. First the tooth is selected, then a piece of 22-k. gold, No. 36 gage, is laid on a small piece of wax, and the tooth is pressed against the gold. The gold being soft and pliable, the platinum pins pass through the gold easily, with a better adaptation of the gold to the pins than if the plate punch is used. With a pair of pliers the gold is pulled down over the tip of the tooth, this is bent over and a little crimp is made in the gold to allow the gold to come up over the porcelain, and prevent the solder from going over the tip. When it is desired to put a gold tip on the tooth, after crimping at tip, extend it out to the required length, then bend it back so as to make a box. Lay the tooth on a magnesium soldering block, size 24, and solder, using 20-k. solder. The case will cool in five minutes. Finish in the ordinary manner.

Dr. H. A. Pullen, Buffalo, gave a clinic on some unique crown soldering clamps very similar to the orthodontia clamps which were brought to the notice of the profession some years ago, but being adapted to the requirements of soldering in the making of bands and crowns in crown and bridge work. The set consists of two clamps constructed of No. 18 gage wire, and possesses the advantages of holding the band or crown automatically while being soldered, and relieving all pressure from the fingers in manipulation, as well as taking up very little of the heat in soldering, thus minimizing the danger of burning and securing a uniform soldering in the shortest possible time.

Dr. W. H. Leak, Watertown. "Antiseptic Root-Canal Filling with Amobilis." The clinician first showed a piece of glass slab on which were small cakes of amobilis set. This was passed about, and attention was called to the tenacity of this material, even to a glass slab. The clinician then demonstrated how easily this material disintegrated on the application of a few drops of water. Several teeth, presenting all shapes of root-canals, were then shown, and by the addition of a drop or two of water and a little trituration with a broach, then syringing with

a stream of water, the cement was removed from the canals of any of the teeth in two minutes. The root-canals of these teeth were then refilled with amobilis, illustrating the ease of manipulation. It being not in the least sticky to handle, shreds of cotton on the broach become unnecessary, and its slow-setting quality allows the operator plenty of time for manipulation. The clinician claimed as the principal advantages of this material its ease of manipulation and the ease of removal from the canal in case of subsequent trouble.

Dr. G. W. Cochran, Erie, Pa. "Surgical Treatment of Chronic Alveolar Abscess." The subject was a dental student from the University of Buffalo. Lesion was upper right central incisor tooth that had been filled with gold mesio-distally several years previous. Pulp had died from shock of thermal changes, and developed an alveolar abscess and an open sinus labially.

According to the subject's history of the lesion, the pulp-canal had been opened, and had been under treatment for the past eight months, with the customary medicaments applied through the pulp-canal for chronic alveolar abscess, but the pathological conditions would not become normal under the canal treatment.

Dr. Cochran diagnosed the case as one that had passed beyond the stage of chronicity, and had developed considerable necrosis of the maxilla about the apical region of the tooth, which he forthwith proceeded to surgically demonstrate was a correct diagnosis. As the student was desirous of learning as much as possible about the surgical treatment of such lesions, the operator used hypodermically a one and a quarter per cent. solution of freshly prepared cocain, and completely anesthetized the territory he wished to operate upon. The temporary stopping was removed from the canal, and the apex of the root was tested with a large-sized broach to ascertain how much, if any, resorption of the root had taken place. The large broach did not pass through the apex, so a No. 5 Donaldson broach was inserted into the canal, and passed fully a quarter of an inch beyond the apical portion of the tooth, demonstrating conclusively the existing condition. By the nerve-broach canal measurement, the operator explained, one was enabled to ascertain to a certainty the outside or labial measurement, that is, the exact spot to make the incision through the muco-periosteal membrane.

When the local anesthetic was applied, the syringe point (which was an obtuse one) dropped right into the necrosed pocket, showing that the cortical layer of the maxilla was necrosed, as was the cellular portion of the bone above the apex of the tooth. After waiting a few minutes for the anesthetic to operate, an incision was made with a bistoury and the part thoroughly explored. Those about the chair were invited to examine the case, and several did so. The necrosed bone was then thoroughly curetted away with a large-sized surgical bur and spoon-shaped excavators. The canal was irrigated with hydrogen dioxid 3 per cent., and the alveolar pocket was surgically dressed with iodoform gauze 5 per cent., with instructions from the operator that the wound should be irrigated daily for a week or ten days, and every other day during the following two weeks.

The operator cautioned those practicing this method of eradicating chronic alveolar abscesses and necrosis of the maxillæ, as to the great necessity of observing thorough asepsis, thus avoiding infection of the wound.

Dr. P. W. Smith, Palmyra. "Copper Disks and Carborundum Grit in Preparation for Shell Crowns." The clinician said that fully eight of every ten shell crowns are poorly fitted at the edge of the gum, owing to faulty preparation of the stump. As an aid, a set of three cups and two disks of No. 30 gage copper—the cups $\frac{1}{2}$, $\frac{11}{16}$, and $\frac{3}{8}$ inch respectively, and the disks $\frac{11}{16}$ and $\frac{3}{8}$ inch — with No. 180 or No. 220 carborundum grit, will simplify matters. The disk moistened, turned in the grit a revolution or two to engage a few particles, will separate mesially in a surprisingly short time,

cutting a clean slice off, thus avoiding touching the adjacent tooth. In the same manner one of the two large cups separates distally. The cusps and the sides having been ground roughly with stones, the small cup will finish up to and under the gum, trimming the corners accurately and easily. The concave surface is most used for grinding, and the revolving edge has the delicacy of the finest explorer.

A stone will not do this work properly, and the appliances advocated here are superior to the diamond-charged cups and disks, for the following reasons: First, they cut fully as fast, and at the edge; secondly, they are not ruined by running dry; thirdly, they are not so liable to catch and buckle; fourthly, cleansing is more perfectly accomplished, therefore asepsis is more perfect; fifthly, the initial cost per set of five is nominal.

Dr. Smith also gave a clinic on gutta-percha and cement setting, using Caulk's temporary stopping. His plan is to merely line the contour of the crown from edge to solder reinforcement, filling all undercuts, but not the top. Try on the tooth to make sure of no interference with the fit, and set to place with cement as usual. The cement affords a firm base for mastication, while by warming the crown the gutta-percha allows removal.

Dr. Richard Kessel, Buffalo. "Demonstration of Rauhe's Plate Retainer for Partial and Full Dentures." Dr. Kessel said: This is an improvement of a suction chamber used about twenty-five years ago. The improvement, however, is so material that it may be called a new invention. Since I have given this clinic I have heard of the use of from twenty to twenty-five of these retainers. The unanimous expression was that every one of the retainers was a surprising success. These chambers hold the plate well into position, and do not irritate the mucous membrane in the least. Another great feature is that this retainer will work as long as the plate is worn by the patient. In the ordinary suction chamber the tissue will fill up the chamber, and then it becomes useless. This chamber is also supposed to overcome the necessity for gold clasps in partial plates, although this suggestion has not been as yet tried. Each retainer is composed of a button, three tacks, a piece of tin, and three rubber disks. The piece of tin is adapted to the cast with the thumb. On top of the tin lay the button with the side of the hole exposed to view, and press it well down so that it will fit accurately; then throw away the tin, which is only used to prevent the marring of the cast while adapting the button; replace the button on the cast and tack it down, and make the plate in the usual manner. Boil the wax out which might have melted into the hole of the retainer, then pack the plate, being sure to put a few small pieces of rubber into the hole of the retainer, then vulcanize the plate. Care should be exercised in the removal of the retainer after the plate is vulcanized. The retainer is made out of two layers of tin, and between them is a gold disk. Prize the layers of tin apart, which will remove the upper one; the lower one has a device by which it is removed. After the plate is polished, ready for insertion, fasten one of the three rubber disks. The other two are given to the patient in case one should tear, or should be removed for hygienic reasons. It is necessary that a perfect impression be procured. Do not scrape the impression or the model, as otherwise the rubber disk will not come into contact with the roof of the mouth. If you fear that the plate may rock on account of hard places in the palate, these should be relieved with tin.

This retainer is very useful for flat mouths. Where there is a large bony growth in the center of the palate, it is necessary to use two retainers, one on each side. Also in partial plates it requires two retainers in the place of the two gold clasps. These retainers may be obtained of any dealer.

Dr. H. L. Belcher, Buffalo. "Manipulation of Soft Gold in Conjunction with the Crenshaw Contour Matrix." The cavity is a mesio-approximal in an upper bicuspid. No undercuts are made, it being shaped slightly broader at the base

than at the occlusal aspect. The approximal walls are cut at right angles with the base of the cavity. Where soft gold is used the margins of the approximal walls should not be beveled.

The matrix. The Crenshaw contour matrix is a great aid in filling the difficult, inaccessible approximal cavities such as we frequently find in bicuspids and molars. The matrix also greatly simplifies the cavity, especially if it is of the compound class. The points in favor of the matrix are: (1) Simplicity in construction. (2) Ease of adaptation. (3) Ease of removal. (4) Assistance in restoration of contour. (5) Its stability—remaining where you put it, etc.

The gold. In preparing the cylinders one-third, one-half, and in extremely large cavities, one whole sheet of gold is sometimes employed in each cylinder. In this case one-half sheet of No. 3 soft foil was used in each cylinder. The foil is made into a flat ribbon (by the aid of the chamois pad and foil knife) and rolled on a square Swiss broach. After removing the cylinder from the broach, the ends are flattened (slightly condensed) between the blades of the foil carrier. The whole secret is in making the cylinder of the right size, and this is acquired by practice.

Manipulation of the cylinders. Generally three or four are used, sometimes five. Start at the most inaccessible portion of the cervical aspect, whether it be buccal or lingual, place the flat side of the cylinder against the base and wall, give the cylinder a slight lateral pressure with a broad-faced instrument to give adaptation, and allow the cylinder to hug the walls. To insert the third and fourth cylinder, a little wedging may be resorted to. After the cylinders are in position and bulging over the cervical margin and up against the matrix wall, start to condense, lightly at first and gradually working up to heroic pressure, after which two-thirds of the most difficult portion of your cavity is filled. At this point the semi-cohesive gold is locked into the soft gold.

Dr. Belcher claims as the advantages of this method—(1) Great saving of the tooth-structure; (2) saving of time; (3) much less suffering and fatigue, alike to the patient and operator; (4) less danger of subsequent trouble from pericementitis, or pulpitis if the tooth be a vital one.

A full description of the use of the matrix is given by Dr. Crenshaw in the DENTAL COSMOS for July and August 1902.

NEW YORK ODONTOLOGICAL SOCIETY.

Monthly Meeting, March 1905.

A REGULAR meeting of the New York Odontological Society was held on Tuesday evening, March 21, 1905, at the Academy of Medicine, No. 17 West Forty-third street, New York city. The president, Dr. Jno. I. Hart, occupied the chair and called the meeting to order.

INCIDENTS OF OFFICE PRACTICE.

Dr. H. W. GILLETT. I brought this pair of pin-pulling forceps here, having found them very useful. As you will note, they are narrow-bladed forceps with screw and nut on the side, so that the blades may be shut on the pin from which a porcelain tooth has broken away, the nut turned to get a tight grip; then by turning this screw at the end, the pin is separated from the root. I have found these forceps very effective.

Dr. W. J. TURNER. I have models of a case which came to me last week. I bring them forward to show what has been done. I myself have done nothing to the case at all. It has been under treatment for about two years. The mandible projects very much. From what the mother says, this work has been done by Dr. Angle's method. An expansion arch has been on the mandible and one on the maxilla, and they have been connected by rubber bands, tending to draw the mandible backward and the maxilla forward. There is still a great deal to be done as development goes on.

Dr. WM. JARVIE. While the models are being passed around, I would say a few words of a case which is of some interest to me. It presented itself some ten days ago, when I was exceedingly busy, and was uncertain what was best to do with it—there is so much to be done. The patient is a gentleman of about fifty-five years of age, solidly built, well preserved, and a man who has evidently used his teeth thoroughly, for he has chewed them all up. He has been a patient of mine for a few years, but I have not seen his mouth for about two and a half years, and during that time this great loss of substance has taken place. The upper incisors are badly worn, and the pulps are almost exposed. They are quite sensitive to acids, to heat and cold, and I would like to get the opinion of some of the members as to the best way of treating the case. The models indicate fairly well the condition. The gentleman's expression when his jaws are closed indicate that the bite must be opened, for his lips are pursed, and his chin and nose come much too close together. I think the pulps in nearly all the teeth are alive. I do not remember that any of them are dead, although they may be in one or two out of the twenty-five or twenty-six teeth which are in the mouth.

The loss of tooth-substance is largely due to attrition, and if erosion has been a factor at all its action has been confined to the ends of the teeth.

Dr. F. T. VAN WOERT. Dr. Jarvie spoke of this case last night, and after seeing the models this evening I would suggest raising the bite with heavy gold crowns in the back of the mouth, devitalizing the pulps, and putting porcelain crowns on the six anterior teeth, upper and lower—and a bridge on the left side.

Dr. R. OTTOLENGUI. I think when you look at models, very often you are led astray. Some of the teeth might not be exactly suited for porcelain crowns, as Dr. Van Woert suggests. For instance, nearly all of those teeth probably have partly calcified pulps, and it will be a serious proposition to drill into the canals of those teeth. At his age, if the teeth are healthy, it seems to me more advis-

able to use something in the nature of jacket crowns, making bridges of three or four teeth together, after having first raised the bite with heavy gold crowns in the posterior region.

Dr. Van Woert. Does Dr. Ottolengui mean he would not attempt the devitalization of those pulps?

Dr. Ottolengui. I think I would not.

Dr. Van Woert. I still think they can be crowned with porcelain anyhow. I would not have said this a month ago, but I have had a very marked experience in a region of the country where I have seen things that simply astound me. I would attempt it now without any hesitation. With the methods of making porcelain crowns that Drs. Taggart and Goslee showed me in Chicago, the pulps could be retained. I do not think there would be danger of drilling through or interfering in the least. If the bite is raised with heavy gold crowns in the first place to put the greater amount of stress upon the posterior teeth, the all-porcelain crowns will stand the rest. I still hold my original position, that the six anterior teeth should be crowned with porcelain under those circumstances, and the posterior with heavy gold crowns, making them exceptionally solid on the grinding-surface—probably of 14-karat —something to stand a heavy strain.

Dr. Ottolengui. I think Dr. Van Woert is not differing with me as much as he thinks he is. Some of the crowns are so small that it would be hazardous to make single crowns. Why not unite them?

Dr. Van Woert. Yes, I would accept that.

Dr. E. Gaylord, of New Haven. How would Dr. Ottolengui keep those surfaces between the teeth cleansed where he unites two or more teeth?

Dr. Ottolengui. There is no space between; we put gum body between to fill in.

Dr. Gaylord. But there must be a space between them. How far below the gingiva would you extend this jacket crown?

Dr. Ottolengui. Slip it up tight against the gum.

Dr. Gaylord. Don't you leave space between the teeth then?

Dr. Ottolengui. Yes, but we fill in with gum body.

Dr. Gaylord. But above the gum body; between the edge of the jacket crown and the edge of the gum there must be a space that is difficult to keep clean. Do you build it to the apex of the root?

Dr. Ottolengui. Not quite. In that connection Dr. Rhein has proved in cases where he cuts off a diseased root that the gum tissue tolerates the porcelain as it tolerates nothing else. This gum body must be packed tight against the gum. If there is a space between the root-ends, a little platinum floor must be laid there so the porcelain will go there; but I do not see where there would be a space. It has been my experience that instead of the gum shrinking away it grows tighter against the porcelain. There is no space, and it is absolutely clean.

Dr. W. M. Dailey. I would like to ask Dr. Turner whether in his case the mandible was taken into consideration, the same as the maxilla was, or the force applied to the maxilla only.

Dr. Turner. As far as I could make out, from what the mother said, there was an arch on the mandible and one on the maxilla, and they were united with rubber bands.

The President. We had hoped to have Dr. Stockton with us tonight, but unfortunately, after having partially recovered from his recent accident, he was attacked last Sunday with appendicitis, and is now in the hospital, having been operated on successfully on Sunday afternoon. Just before taking the anesthetic he expressed his regret at being unable to be present, and asked Dr. Meeker to read his paper for him. I am sure the society feels the loss of Dr. Stockton's presence; but, under the circumstances, Dr. Meeker will largely replace him, and I know I express the sentiments of the society when I say we hope Dr. Stockton will soon be well and strong, and as hearty as when he was with us a few weeks ago.

A telegram of sympathy was sent to Dr. Stockton in the name of the society, expressing best wishes for his speedy recovery.

Dr. Meeker then read Dr. Chas. S. Stockton's paper, as follows:

Interchange of License to Practice Dentistry; or, Reciprocity Between Dental Examining Boards.

Let us take a journey with the sun, and circle the wide earth; and wherever its warm rays shine and beautify, there we will find humanity gathered—in village, town, or city. And there also we will find a dentist, qualified and licensed to take care of the teeth.

Dentistry is not a very old profession, as it dates back only about sixty years, to the time of the chartering of the Baltimore College; yet we find that it was practiced by the Egyptians, and the mummies have their teeth filled with gold and cements, the latter, it is said, surpassing those of today.

Before, and many years after, the establishment of the Baltimore College, anyone who felt himself qualified to practice dentistry could hang out his shingle, and there was no one to say him nay. Men graduated from the blacksmith's shop into dentistry, put out their sign, and were called doctor; others came from the jeweler's bench, and made excellent dentists. Some who are here tonight can recall such instances.

All this has been changed. Today no one can begin the practice of dentistry unless he is a graduate of a dental college, has passed successfully a board of state examiners, and received from it a license; no one now can begin the study of dentistry unless he is a graduate of a high school, or has an education equal to that necessary to enter the freshman class of a college or university.

The young men of today who are required to take a three or four years' college course have an education far in advance of those who began to practice twenty or more years ago; and it is perfectly right that these young men, on entering the profession, should pass examinations before the boards of the several states. But it is a very different matter to require men to pass such examinations who graduated many years ago, when the course of study embraced only two years. Nearly all the states and territories have laws governing the practice of dentistry. These laws were enacted for the purpose of keeping out incompetent men. They were not enacted for the purpose of preventing competent men from practicing, yet many boards seem to be imbued with the idea that the very letter of the law must be carried out. I wish tonight to show you the injustice of this view.

It is practically impossible for anyone who graduated years ago, even though he may now be a professor in a college, or a member of a board of examiners, or as skilful a practitioner as the profession contains, to pass a successful examination according to the standards of today.

If so, I ask if, having once passed an examination, and fulfilled all the requirements of the state where he resides, for any cause he should wish to remove to another state (presumably on account of ill health either of himself or of his family), is it right that he should be subjected to *another* examination?

Dr. Ottolengui very justly says:

"When a state board refuses a license to a practitioner from another state, it casts a slur upon the board of the state from which the candidate hails.

"The main reason which compels a dentist to abandon practice in one section, and move to another, is usually ill health. He has to go where the climate is such that he or his sick wife may be healed, and he should have every courtesy shown him. To do this, to recognize the license of other state boards, and to grant interchange of license, is to create of dentists a great fraternity; to do otherwise is to be guided by the least defensible methods of trades unions."

From a gentleman who lately went to California, I received a letter in which he writes as follows: "I have had an opportunity of seeing some of the injustices that have been perpetrated in the

name of the law since I have been in California, and, having had the honor of acting on the New Jersey board, I think I fully understand some things into which I would not have had as clear an insight had I not had such an experience. One thing that seems not to be in the minds of examining boards is that the statutes respecting such boards were not passed by the legislature, and sanctioned by the people, to inflict hardships on the dentists. Yet, strange to say, most of the boards forget the spirit of the law, and hold fast to the letter of the law, and in a measure really defeat the intent of the provisions of the act."

It is right and proper that a student fresh from college should have a rigid examination, in theory; *this is all he has.* He cannot be expected to have much experience; that takes years of practice to acquire. It has been the student's business for three years or more to acquire this knowledge, and if he has not gained it he is a failure; and it is safe to presuppose he will also fail in practice. But to subject a man who has been out of his student days for years to an examination such as that of a student fresh from college is an unjust hardship and a cruel ordeal. Things that are now taught in the dental schools were not thought of ten or a dozen years ago. I will relate an instance that came under my own observation. A gentleman from the Middle West went to Los Angeles, California, and wanted to go into practice there. His wife's health made the change necessary. He was a member of his state board; had been president of his state and local society; had brought letters from his brother practitioners, and, to put it in the language of another dentist of Los Angeles, "If I could have such letters written about me as were written about him, I would have been so 'chesty' that no one could live with me." Yet this gentleman, a magnificent operator of the type of Parmly Brown, Palmer, and yourselves, was set down with a lot of young fellows, who were babies when he was a recognized dentist. A No. 9, I think, was pinned on his coat, and he was put through the mill and failed in histology, chemistry, and physiology; but his operations in practical dentistry were magnificent. Nevertheless, he was denied a license to follow his life-work in this state. The state board did this man a cruel wrong. They kept to the letter of the law, but how grievously they erred in the spirit of it! This man was a graduate of a dental college, but he studied there when two years was the term. Ask any man (I care not who he may be) if he could pass the examining board in these days with the training in theory he received ten or twenty years ago? It is impossible; and to expect one of forty or fifty years, or older, to sit down and learn the theories and technics of these latter-day colleges is like asking the children of Israel to make bricks without straw.

A gentleman whom you all knew and loved as I do occupied this platform years ago. He practiced dentistry in the city of Brooklyn, but resided in New Jersey. He found it a burden, as years advanced, to go back and forth, and gave up his Brooklyn office, supposing that he could apply to the state board of New Jersey and secure a license to practice at his home. This gentleman was one of the finest operators in the country, and one of the most widely known men in dentistry. When on any particular occasion dentistry was to be honored, he was called upon for the service, and when I mention his name you will all admit that we have none among us who could do it so well as he.

Yet, notwithstanding all these circumstances—that the journey to Brooklyn was becoming a burden; that he would like to practice a little among his friends; that he was getting old, Dr. Charles A. Marvin had to sit down among the boys and take his examination.

This was an outrage; and on hearing of it, I resolved that if ever in an official position I would try to right this wrong. Therefore, very soon after I became a member of the state board of examiners, I wrote what is called the "Asheville resolution," which, by direction of my own state board, I took to the National Board of Examiners meeting at Ashe-

ville, and it was there, after a full day's discussion, unanimously adopted, viz:

"Resolved, That an interchange of license to practice dentistry be and is hereby recommended to be granted by the various state boards, on the following specific conditions:

"Any dentist who has been in legal practice for five years or more, and is of good moral character, and who is desirous of making a change of residence into another state, may apply to the examining board of the state in which he resides for a new certificate, and said certificate, if granted, shall be deposited with the examining board of the state in which he proposes to reside, and the said board, in exchange therefor, may grant him a license."

The year rolled around. A few of the state boards entered into an agreement with New Jersey for interchange under this resolution. Again, under the codification of the laws of the National Board, it came up, exciting a good deal of discussion, being amended in this particular only: that the candidate receiving the certificate must have continued five years in one place, and also be a member of the state or local society in which he practiced. It was again unanimously adopted.

Now, gentlemen, this is the resolution under which it is hoped that all the state boards can come to an agreement by which any dentist who has practiced his profession five years in one place, who is of good repute as a dentist and as a good citizen, can obtain the certificate in the state where he lives, and on removing to another state may find that that certificate will be received by the examining board as a sufficient guarantee of his being qualified to practice dentistry. It is our claim that if a man having once passed his examination is declared qualified to practice dentistry in New Jersey, he should be allowed to practice his profession in any state in this Union.

A citizen of any state can go into another, and by complying with certain time requirements can there exercise the right of a citizen; and so I claim that we should have an equal right to go into any state in the Union and practice a calling which, to many of us, is dearer and much more necessary than is the mere right to vote.

The Asheville resolution is so just and fair that it should commend itself to every examining board.

The candidate for exchange must have been at least five years in continuous practice in one place. In that time he has established himself as a good or a poor dentist, and has also made manifest his moral character. If he is deficient as a dentist or as a man, his application will not be granted, because, if granted, the board would be responsible for his shortcomings. It should be clearly understood that his home board is the responsible party; that it sends him with the seal of its approval; that he bears its letter of credit, its letter of introduction; and it should be a sufficient guarantee to any state board in this land to issue to him a license to practice dentistry without any other demonstration of his qualification. The spirit of the Asheville resolution is what we ask shall become the universal practice of all state dental examining boards.

We of New Jersey have entered into this agreement with the state board of New York:

(1) It is understood and admitted that the standard of the professional examination of each board is practically equal, and though different in detail, is mutually acceptable.

(2) Licentiates of the New Jersey Board, who have received the degree of D.D.S., or other recognized dental degree, are to be granted licenses to practice in New York state without examination, on payment of the regular licensing fee; provided the preliminary education of the candidate is equal to that required by the New York statute; and licentiates of the New York Board are to be granted licenses to practice in New Jersey under the same conditions.

(3) Immediately after any examination by either board, complete sets of the questions used shall be mailed to the examiners of each state, to the State Dental Commission of New Jersey, and to the Examination Division of the Educational Department of the state of New York.

(4) Applications for license under this interchange agreement shall be indorsed, in New York state by the president and secretary of the Board of Examiners, and by the

First Assistant Commissioner of Education, and in New Jersey by the president and secretary of the Examining Board, and by the secretary of the Dental Commission; and shall be accompanied by the original or certified copies of certificates of preliminary education.

(5) The names of unsuccessful candidates in each state shall be sent to the secretaries of the examining boards, and to the Educational Department or Dental Commission, as the case may be.

(6) All papers connected with the examinations shall be placed on file with the Educational Department, or Dental Commission, and shall be public records.

(7) Those who have received a New York state license to practice dentistry granted since 1895, or a New Jersey license granted since 1895, may apply for the interchange established by this agreement.

WILLIAM E. TRUEX,
CHAS. A. MEEKER.

For the New Jersey State Board of Registration and Examination in Denistry.

WILLIAM CARR,
H. J. BURKHART.

For the New York State Board of Dental Examiners.

Approved December 29, 1904.

This makes it possible for anyone who has an education equivalent to the requirements of the law of New York to come here and practice. But it must be distinctly understood that all those who have been in practice over five years will have the benefit of the Asheville resolution—a mere nominal examination. Those who are just from college (and although we have no college in New Jersey, many students of course may reside there) will pass the regular examination.

The result of a careful canvass of the laws of all the states will be found in the following *résumé:*

Alabama. No special examination granted to practitioners already in practice. No interchange of license with any state.

Arizona. No interchange.

Arkansas. No special examination granted to practitioners already in practice.

California. No special examination granted to practitioners already in practice. No interchange of license with any state.

Colorado. No special examination granted to practitioners already in practice. No interchange of license with any state.

Connecticut. License in other states not received in lieu of examination. No interchange.

District of Columbia. Reciprocal interchange of license with the state of New Jersey, in accordance with the provisions of the Asheville resolution.

Indiana. No special examination granted to practitioners already in practice. Reciprocal interchange of license with the state of New Jersey, in accordance with the provisions of the Asheville resolution.

Iowa. No special examination granted to practitioners already in practice. No interchange of license with any state.

Kansas. No special examination granted to practitioners already in practice. No interchange of license with any state.

Kentucky. No special examination granted to practitioners already in practice. No interchange of license with any state.

Louisiana. No special examination granted to practitioners already in practice. No interchange of license with any state. The board has the matter under consideration.

Maine. No special examination granted to practitioners already in practice. No interchange of license with any state.

Maryland. No special examination granted to practitioners already in practice. No interchange of license with any state.

Massachusetts. No special examination granted to practitioners already in practice. No interchange of license with any state.

Michigan. Practitioners already in practice may have a special examination before any member of the board, which will enable him to practice until the next regular meeting of the board, when a regular examination must be taken. Reciprocal interchange of license with New Jersey, in accordance with the provisions of the Asheville resolution.

Minnesota. No special examination

granted to practitioners already in practice, and the board has no power to grant temporary license of any kind. No interchange of license with any state.

Mississippi. Practitioners already in practice will be granted an examination by any member of the board, who is authorized to issue a temporary license which will be valid until the next succeeding meeting of the board.

Missouri. No special examination granted to practitioners already in practice. No interchange of license with any state.

Montana. No special examination granted to practitioners already in practice. No interchange of license with any state.

Nebraska. No special examination granted to practitioners already in practice. No interchange of license with any state.

Nevada. No special examination granted to practitioners already in practice. No interchange of license with any state.

New Hampshire. No special examination granted to practitioners already in practice except by agreement of the full board. No interchange of license with any state.

New Jersey. Reciprocal interchange of license with Utah, Vermont, District of Columbia, Tennessee, Indiana, Michigan, in accordance with the provisions of the Asheville resolution, and by special agreement with New York.

New York. Applicants who have had six years' practice in dentistry may, on unanimous recommendation of the board, receive a license to practice in this state, provided they meet the necessary professional and preliminary requirements. Examination fee $25. Reciprocal interchange of license with New Jersey.

North Carolina. No special examination granted to practitioners already in practice. No interchange of license with other states. Will interchange with any state whose requirements are the same. (That is all right.)

North Dakota. No special examination granted to practitioners already in practice. No interchange of license with any state.

Ohio. No special examination for practitioners already in practice. No interchange.

Oklahoma. No special examination granted to practitioners already in practice.

Oregon. No special examination granted to practitioners already in practice. No interchange of license with any state.

Pennsylvania. No special examination granted to practitioners already in practice. Reciprocal interchange of license with New York.

Rhode Island. No special examination granted to practitioners already in practice. In regard to interchange, the board has recommended an amendment to the law giving the board discretion.

South Dakota. No special examination granted to practitioners already in practice. No interchange of license with any state.

Tennessee. No special examination granted to practitioners already in practice. New Jersey reports interchange with Tennessee, but the secretary of Tennessee reports no such interchange as yet.

Texas. No special examination granted to practitioners already in practice.

Utah. No special examination granted to practitioners already in practice. Reciprocal interchange of license with New Jersey, in accordance with the provisions of the Asheville resolution.

Vermont. Interchange with New Jersey.

Virginia. No special examination granted to practitioners already in practice. No interchange of license with any state.

Washington. No special examination granted to practitioners already in practice. No interchange of license with any state.

West Virginia. No special examination granted to practitioners already in practice. No interchange of license with any state.

Wisconsin. No special examination granted to practitioners already in prac-

tice. No interchange of license with any state.

Let us hope that all the other state boards will soon follow the action taken by New Jersey, and that soon every board will swing into line. If this is not possible under the present law, then let the law be changed. Then any well-qualified dentist will be allowed to practice dentistry wherever he may seek to do so, under the shield of the Asheville resolution.

Let us carry out the spirit of the laws in the various states—enactments solely intended to prevent incompetency, and not for the purpose of preventing any properly qualified dentist from practicing.

We simply ask that the laws be administered in a broad and generous spirit.

A fact of history conveys my idea of reciprocity. When Abraham Lincoln went to Springfield, Ill., to practice law, he made the acquaintance of the old doctor of the place, who was the man of the town, and who made it his special business to become acquainted with all newcomers. The doctor said to his wife, "There is a young man by the name of Lincoln who has come here to practice law, and I like him. I will bring him around and introduce him to you, and I hope you will like him and invite him to dinner, for he is staying over at the tavern, and I don't believe he gets half enough to eat." He did introduce him to his wife, and he was there many times to dinner. One day the doctor said to his wife, "You have a lot of old furniture of no use to you or anybody, and I have a vacant house down the street. Now, let me put your furniture in my house, and we will see if we cannot get Lincoln in there." So one day the old doctor said to Lincoln, "My wife has a lot of antique furniture that she thinks a great deal of, and she is afraid that the tramps may get in there some night and the things be burned up. Do you know anybody whom she could get to go in there and take care of it?" Mr. Lincoln said, "Why, doctor, I will go sleep there, and keep the tramps away." "Will you? My wife will pay you for it." "Oh," said Lincoln, "I do not want any pay." So Lincoln was installed in the house and was at the home of the old doctor and his good wife much of the time. Before starting on his journey for Washington, to be inaugurated as president, Lincoln said to a young man, "John, go home and write me a letter." John said, "What about, Mr. President?" "Oh, anything. Write it and bring it back to me." John did so; he brought his letter back to the president, who took it and looked it over and said, "Why, John, you write well,"—and looking at it again, "And you spell well, too" (John was a graduate of college), and then his face straightened down with that wonderfully serious look so well known to all, and said, "John, your father and mother have done more for me than any other beings in the world. I want to show you that I reciprocate their kindness, and I now appoint you my secretary to go to Washington with me." Mr. Lincoln took this young man, who was the son of the old doctor, to Washington with him, taught him honest statecraft, and today he is the secretary of state, John Hay, the greatest living diplomat of the world. That is the kind of reciprocity I believe in.

I quote two stanzas, entitled "Reciprocity," and I hope that some of the state boards that think they have something better than New Jersey offers them will read and apply the sentiments so beautifully expressed:

RECIPROCITY.

Her folks have taken worlds of pains to raise her;
She stands the fine fruition of their plan.
At figures quite unheard of they appraise her,
And she's gone and given herself to that young man!

But never mind! His mother thinks he's priceless;
His father sat up nights to keep him good.
She'll have him for her own—fond, fresh, and viceless;—
Things really work out sometimes as they should.

Discussion.

Dr. C. A. MEEKER. This subject is very dear to Dr. Stockton's heart, and he

felt very sorry that he could not be here. He thinks that what he says here will help along interchange and reciprocity in all parts of the country. I am sorry I cannot be as forceful as he would be, because I have not the same feelings on the subject.

The PRESIDENT. Dr. Stockton requested that several gentlemen be asked to discuss the paper. Among them was the name of Dr. Carr, but through an oversight Dr. Carr's name was omitted from the notices.

Dr. WM. CARR. I am deeply interested in this subject and indorse nearly everything contained in the essay; but I do not think that all the suggestions of the essayist can be accomplished until the laws of many of our states are amended. However, in the state of New York we have a remedy for all the objections that he raises. There are three ways in which a man may be admitted to practice in this state.

First. Article 168 of our law provides that "On certification by the Board of Dental Examiners that a candidate has successfully passed its examinations and is competent to practice dentistry, the regents shall issue to him their license so to practice pursuant to the rules adopted by them." These rules are, that the candidate shall give evidence of good moral character, indorsed by two reputable practitioners; shall show that he is a graduate from a high school requiring a four-year course, or its equivalent in forty-eight regents' academic counts, and that he has graduated from a reputable dental school.

Second. "On the recommendation of the board, the regents may also, without the examination hereinbefore provided for, issue their license to any applicant therefor who shall furnish proof satisfactory to them that he has been duly graduated from a registered dental school, and has been thereafter lawfully and reputably engaged in such practice for six years next preceding his application." This means that any practitioner of good moral character, who has graduated from a registered dental school, and who has had six years' reputable practice in any state in the Union, can, upon application to the regents, present himself for examination before the examiner residing in the district wherein he desires to practice—this examination consisting of an operation and an oral examination upon everyday topics. Upon the indorsement of such examiner he will receive a license from the regents.

Third. Any candidate "who holds a license to practice dentistry in any other of the United States, granted by a state board of dental examiners, indorsed by the Dental Society of the State of New York, provided that in either case his preliminary and professional education shall have been not less than that required in this state."

The third way I consider to be true reciprocity. This applies to students. The National Association exacts a three years' course. I think that Dr. Meeker has said a three years' clause, but these could not receive reciprocity from New York.

We receive from New Jersey all those who have the forty-eight academic counts. We accept their professional examinations as equal to ours, and do the same with Pennsylvania.

There is a class of men that our law does not accept, and this class is fast dying out. I refer to those who prior to 1879 had received instructions from private preceptors, and took up the practice of dentistry with no other requirements. Such men, coming from other states, cannot be admitted to practice, as our law requires that they must have a diploma.

In New York and in Brooklyn, within the last four weeks, we have rejected six or eight men. They were certainly unqualified to practice dentistry. One of them could not tell what an alveolar abscess was. He said that it was a swelling, and practically that was as far as he could get. This oral examination is a safeguard, and if the other states would put it on the statute books, there would be no trouble.

Dr. JARVIE. Although the paper tonight has been most admirably read by Dr. Meeker, we are all sincerely sorry we

could not have the writer of it present, and our deepest sympathy goes out to him as he lies on his sick-bed in the hospital at Newark. He is a large-hearted, kind-hearted man. Only such a man could have written this paper, for the arguments in it come much more from the heart than from the head. It seems as though it would be a very simple thing to have an interchange of licenses between the various states, but it is not so simple as it seems. Physicians have been trying to accomplish it for many years, and unless it has been done very recently, they have not yet succeeded. Lawyers, too, have been at it for some time without success; so, while it may seem a simple matter, it evidently is not, or it would have been accomplished before this time.

Consider other laws than those regulating the practice of law, medicine, or dentistry. Note the difficulty there has been in obtaining a universal marriage and divorce law. It would seem as though there were hardly anything more desirable than a universal law among the states bearing on that question; but they are no nearer to it than they were many years ago, and yet the best minds of the country have been engaged upon it.

So it is with laws relating to dentistry. The proposition of Dr. Stockton, that any person who has been in practice for five years in any state, and received a license or recommendation from the examining board of that state, be accepted by the board of any other state where he may wish to practice, is objectionable on many accounts. Take New York, for instance: the standard of this state is very high in the matter of the preliminary education and the examination. The combination of the two is higher than that of any other state in the Union. If we are going to make all the states level, let us level up, and not down. New York must not go down. If we can bring all the other states up to our standard, by all means let us have a universal interchange; but until that time I think it would be difficult to induce the members of the dental profession in this state to lower their standard to meet the requirements of this Asheville resolution.

To show the difference in the requirements of this state and some other states, I have jotted down a few figures. The figures are those of 1900; but I do not think there have been many changes since. In twenty-three states there is an examination before license, but twenty-five states require no examination. The presentation of a diploma alone will admit anyone to practice in those states.

Dr. Carr has told you of having rejected some six applicants recently. Every one of those gentlemen has a diploma. My own experience as an examiner under practically the same law during the past ten years indicates that a great many men are very desirous of coming here who are totally unfitted both by education and professional attainments to practice dentistry, and yet by the adoption of any such standard of interchange as is proposed, every one of those men would be entitled to come into this state and practice.

The first state to have any law regulating the practice of dentistry was Alabama, in 1841. From that time until 1868 no other state attempted legislation of any kind regulating the practice of dentistry, when New York enacted a law. From that time to this, New York has kept well in the van, and I am strongly in favor of keeping up the standard which this state has set. For some little time to come, I think that standard is high enough, and it is being raised generally throughout the entire country. I think other states will come up to the standards set by the examiners of Pennsylvania, New Jersey, and New York, and then New York will be only too ready to arrange an interchange with them under the same agreement that has been read by Dr. Meeker, and which it was my privilege to draw up some five years ago in arranging the interchange with Pennsylvania. It is a question to which I have given a great deal of thought. I was on our examining board for about thirty years, and naturally matters of this kind would come up in my line of work. After giving the subject my full-

est consideration, I firmly believe there is only one way of having a general interchange of licenses throughout the United States, and that is to have a national board of examiners. I do not mean a national association of dental examiners, but a national board of examiners, composed say of seven, eight, or nine men from different parts of the country, each of whom shall be selected for his high attainments and strict integrity; and a certificate granted by such a board would be accepted by the board of every state in the country.

Now while a standard like that would be acceptable, I do not think it is feasible at the present time. Yet I would like to see some such board established.

Dr. R. J. Hutchinson. I want to ask Dr. Jarvie whether the case he mentions, and the one Dr. Carr mentions, were not recent graduates; and are not such cases usually recent graduates, who have not had any practice?

Dr. Jarvie. These gentlemen all had been in practice for at least six years. They had diplomas. They tried the examination under the six-year practice clause. Instead of going through the licensing examination, which is a written examination, conducted under the auspices of the board of regents, they were given a practical examination—an oral examination to indicate whether the man had an intelligent conception of the principles and practice of dentistry, and they were required to fill a cavity with gold. The examination is of such a character that the intelligence of the candidate is very soon indicated.

Dr. L. C. LeRoy. Where are those examinations held, and by what body?

Dr. Jarvie. They are held by two examiners, each examination independent of the other, the first being held by the examiner of the district in which the person wants to practice, and the other by the examiner of the adjoining district. Those two examiners must concur in recommending him to the board. There has not been a single case where the board has not adopted the recommendation. Such examinations are held at any time that is convenient; there is no fixed time. I think Dr. Walker will tell you he held one yesterday.

Dr. S. C. G. Watkins, Montclair, N. J. Did any of those gentlemen who were rejected have certificates from the boards of the states they were leaving, saying that they were all right?

Dr. Jarvie. They all had to be reputable practitioners in the state they had been practicing in for the six years next preceding their application.

Dr. R. M. Sanger, East Orange, N. J. I hardly feel competent to discuss clearly this paper. I have given considerable thought to it, but I have not been an examiner for thirty years, like Dr. Jarvie, and I do not know all the details. I know the spirit that has actuated this paper, and I know the spirit which actuates New Jersey in being first and foremost in taking up this subject. That reciprocity is desirable there is no question. That it is a hard nut to crack is equally true; and it seems to me if New Jersey has made a single step forward, it has done well.

I can readily see the difficulties in the way of universal exchange, owing to the very great difference in the standards of the various states in regard to their professional men—what the state expects men to be when they come to practice among the people. I hope the question can be solved in some satisfactory way. I have been impressed with one fact, and that is the apathy of the dental profession at large in regard to the matter. It seems to be a question nearer to the hearts of the boards of dental examiners than any other, and it seems to me a question which must be solved first in the National Board.

It is a remarkable fact, that although this resolution was discussed an entire day before the National Board, and then adopted freely, that those members from the various states went back home and paid no further attention to it and took no action leading to its consummation in their particular district. If it were possible for this society to lend its influence toward the further adoption of the Asheville resolution, I think it would do a very great work.

Dr. Ottolengui. I have given this question some thought, and the more I think of it the more sides it appears to have. A new side has come up recently, and I can bring it out best by following the line laid by Dr. Jarvie. Dr. Jarvie pointed out that on account of the high standard in New York, it would not be advisable for New York to operate under the Asheville resolution. Nevertheless, New York has agreed to an interchange of license with New Jersey, and New Jersey is making more exchanges under the Asheville resolution than any other state in the country. Consequently New York, in an indirect way, is interchanging with all the states that New Jersey is interchanging with. I think there should be an act of specification somewhat similar to the rule of the Metropolitan Traction Company — "No transfers on a transfer."

The real motive of the Asheville resolution is to enable a reputable, competent man to move from one state to another. It is not the intent of reciprocity—and reciprocity will be killed if this advantage is taken of it—to let a man into a state by a side door, when he could not get in directly. As you know, in our magazine we recently compiled the laws of the various states on this subject. I had hoped, as editor, that that would save me a lot of correspondence, instead of which it has increased it. Almost as quickly as a letter could reach me after the first issue of that magazine, a gentleman wrote me from a neighboring state: "I graduated from Michigan, and took my license there. I see Michigan exchanges with New Jersey, and that New Jersey exchanges with New York. Do you think there will be any difficulty in my obtaining licenses in both of these states, because I do not know but that at some time in the future I might want to move into one of them."

I see the New York examiners smiling; but I understand recently the New York board gave an interchange license to a man from Pennsylvania, on which the gentleman applied for a license in New Jersey, having previously failed in New Jersey.

Dr. Carr. Those things will occur.

Dr. Ottolengui. But they should not. A man applying for an interchange license and receiving it, should be required to move into that state and practice there within a year; otherwise his license should be rescinded. Again, a man applying to a state with an interchange license should have practiced in that state five years before it is granted. In other words, he should have practiced five years in the state which recommends him. It is an absurdity to let a man from Michigan enter New Jersey by way of Oshkosh.

Dentistry is growing and dividing into specialties. We have gentlemen who call themselves orthodontists; we have some who do nothing but crown and bridge work, while others only extract teeth with nitrous oxid gas. If those men want to move into a state, should they be expected to pass the usual examination of the general dentist?

High preliminary examination and strict examination as to theory are correct for the undergraduate—the inexperienced man. That man will not have a wide knowledge of practical dentistry, but he must prove he has had his education in dentistry. If, on the contrary, a man comes to you having practiced in dentistry, instead of there being, as some boards boast, "no special examination," there should be, as there is in New York, a special examination, and that examination should be lax in theory and strong in practice.

If a man has been practicing five or six years, he ought to know these things. He might forget the front names of some bacteria, but if he knows how to destroy them, he should be let in. If he is a practical man, he should be able to prove it.

The case cited by Dr. Stockton in his paper is well known in the history of this matter. I know all about it. The gentleman wrote me, "Please do not publish this; I want to try again, and if it is published, they may not pass me." That man was an honorary member of his society for thirty years; a member of the examining board for nine or ten years;

and when his wife fails in health, and finds she can live only in California, he cannot join her because he fails to remember the names of a few bacteria.

Dr. Jarvie made a confession tonight that he wrote that interchange clause. I would like him to explain why he limited the exchange to men who received a license after 1895. That would prevent Dr. Carr, or Dr. Jarvie, or Dr. Walker, or myself from moving to New Jersey. A man before 1895 had more practical requirements, even if the preliminary requirements were not so high. Why was it made for the youngsters who came after that? Why can't I go to Long Branch and make a few dollars myself in the summer time?

Dr. JARVIE. It is only since 1895 that dentists in New York have been licensed upon examination. That is why 1895 was made the limit. Before that time there was no examination.

Dr. OTTOLENGUI. The M.D.S. examination carried a license with it.

Dr. JARVIE. The original interchange of license with New Jersey included all that had been licensed upon examination.

Dr. GOLDSMITH. The spirit of what has been said by all the men present, both from New Jersey and New York, seems to be the same—to allow all reputable practitioners to enter, and to keep out all who are not reputable. I think the six-year clause, exempting them from a written examination and making it optional upon two examiners to pass the man if they think he is competent, is very necessary and practically grants all that is desired by anyone. I got my original license in New York; Dr. Carr indorsed my diploma in May 1889. In the summer of 1899, I desired to practice in New Jersey. I had to go before the New Jersey board, because they informed me that much to their regret they could not grant me a license, as the law did not permit it. I passed that examination, and they did not keep me out. While the examination was a little hard on me, and I did have to cram a little in certain subjects, I passed it, and they treated me very courteously. With the laws extant, I do not think such a case as was cited tonight could happen in the East; I do not see why it should happen in the West.

Dr. B. F. LUCKEY, Paterson, N. J. As a member of the New Jersey board I do not think I should say much on the subject. I have experienced a great deal of pleasure in listening to the paper. Dr. Stockton understands exactly the subject he has presented. He thought deeply and clearly when he formulated the Asheville resolution. He advised and conferred with his friends on the subject, and when he put that Asheville resolution before the world, he did what in my judgment was one of the wisest things that has yet been advanced in the matter of dental regulation.

New York is not ready to accept it. New York dentally considered could and would accept it; but New York dentally considered is hampered by New York legally considered. A man can pass his examination in New Jersey, or Pennsylvania, or Massachusetts, and get one hundred per cent. as a dental practitioner. He can come over to the State Dental Board of New York, and get one hundred per cent., but he cannot practice in New York unless the board of regents pass that man on his preliminary requirements. That is the situation as it is today.

New York plumes itself, and wraps itself in its own exclusiveness. They say, "We have the standard; we are the people. You must level upward and not downward."

Did Dr. Northrop, or Dr. Perry, or Dr. Jarvie have to pass such a preliminary examination? Could they pass such an examination today? Perhaps they can; but there are many gray-haired men today who are the peers of any man in the world, who could not pass the examination—not because of the board of dental examiners, but because of the board of regents.

As a representative of New Jersey, I say, Let New York stand alone if it will, but we will have the rest of the United States with us. The Asheville resolution is going to be the dominant factor in the regulation of dentistry. Poor Dr.

Stockton on his sick-bed today has our sympathy; but he was in the vigor of his intellect when he formulated that resolution, and those men at Asheville reached a conclusion that in my judgment will yet bring about the result that we have all been aiming at for years. For more than twenty years it has been my hope and desire that a man who was competent to practice legally, reputably, and respectably as a professional man, and as a gentleman, in any city or state of this country, could practice in any other city or state of the country; and I believe he ought to be allowed to do so. Barring legal restrictions, dentistry is a unit. The dentist of New York is no better than the dentist of San Francisco—the dentist of Maine than the dentist of Florida. If he is competent to save your teeth or my teeth in the one state, he is competent to do it in another state. The only obstacle is the legal restrictions placed in his way by politicians. This New York law concerning the board of regents has been brought about and is dominated largely by politics. I believe —I may be mistaken—that it is the only state in America that has such a restriction.

While I want to see dentistry level upward, and to see every necessary requirement for the education of the young man apply, while I want to see him made equal to the best there is in the world, I do not want to see requirements that limit his usefulness, and that do not apply to the profession which he practices.

Dr. Carr. While Dr. Luckey was addressing the audience, I was obliged to think that he was either talking against time, or was ignorant of the provisions of our law, although but a few months ago I explained to him fully the provisions of our law, to which he now takes exception.

In the state of New York we require that all recent graduates shall also be graduates of a high school with a four years' course, or possess an equivalent of forty-eight academic counts. All others who are graduates, and have had six years' reputable practice in any other state, can present themselves for examination and license under what is known as "the six-year exemption clause," without regents' academic counts. This I think takes care of those whom the doctor has so graphically described tonight—the men with hoary locks, and who have been fighting for professional reputation and standing in other states. I may say that all such men are welcomed into the state of New York, and repeat that all such a man has to do is to apply to the examiner of the district in which he desires to practice, and upon stating that he is a graduate of a reputable dental school, and has been reputably engaged in the practice of dentistry for six years preceding his application, the examiner is compelled to examine him only on practical topics. To make this a little more clear, let us suppose that such a man desires to practice in the borough of Brooklyn. He would call upon Dr. Walker, perform an operation in Dr. Walker's presence, and pass an oral examination. Dr. Walker would then request him to call upon me, being the nearest examiner, and I would then examine him orally upon practical topics.

We are glad to receive any reputable practitioner. Why, Dr. Luckey himself could present himself tomorrow, and I am quite confident that he would pass. (Laughter.)

We have no barrier around our law; it is clear as the noonday sun!

Dr. Luckey. I claim that we are equal in the matter of professional requirements. After a man has applied under the six-year exemption clause—myself, for instance—how am I to meet this board of regents who require this preliminary examination?

Dr. Carr. You do not have to go before a board of regents. It is a state board of dental examiners. The six years' practice is accepted as equivalent to the forty-eight academic counts. Those who come to me, and pass the oral examination, I send to Dr. Walker, who will examine them on the same topics. We then jointly recommend the candidate to the regents and the board for license. The regents fill out the appli-

cations, and send them to each examiner in the state, who signs the application, returns it to the regents, when the license is duly issued. In no instance has an applicant been refused license because of the failure or refusal of an examiner to sign the indorsement of another examiner.

If you would only have your law so amended as to include the provision known as the six-year exemption clause, every reputable practitioner would be provided for in every state in the Union.

Dr. JARVIE. I do not think Dr. Carr was a bit too severe in criticising Dr. Luckey's remarks. Dr. Luckey was exceedingly eloquent, and I enjoyed his eloquence as much as anyone; but his logic was bad. He carried you away in his sympathy with the poor man who had been in practice for many years, ill perhaps, and seeking another climate, but who could not come into New York and practice. In the paper read tonight was cited the case of Dr. Marvin, who practiced dentistry in Brooklyn for forty years. No gentleman stood higher in literary or professional attainments. He was a professor in the New York College of Dentistry for years. His wife was an invalid and could not live in New York; he wanted to practice in New Jersey. He was not permitted to do so until he had passed an examination such as a recent graduate had to. Let a man of Dr. Marvin's standing come from New Jersey to New York, and he can practice within two weeks. That is the difference between New York and New Jersey, and not as Dr. Luckey represented it.

Any gentleman who has been in practice reputably for six years, as has been said tonight, can go before two of the examiners, pass an oral examination—a very informal one on the ordinary everyday work of the dentist— and if he shows intelligence and knowledge he will get his license to practice in this state. Dr. Luckey asked if Dr. Perry, Dr. Northrop, or myself could meet all the requirements if we wanted to come from some other state into New York today. Certainly we could; not that we are any more intelligent or any better educated than any other men in the room, but I believe every man in this room could pass all the requirements of the New York board.

Dr. LUCKEY. The point is, could you produce your forty-eight counts?

Dr. JARVIE. You do not require it, Dr. Luckey. Dr. Carr is a little mistaken when he says the six years' practice is equivalent to the forty-eight counts. It is not required from any person matriculating before 1899. We do not require anything from a man outside the state of New York that we do not require from the men in our own state. You gentlemen from New Jersey, if you had a full knowledge of all the requirements of the law of the state of New York, would say it is fully as liberal as that of your own state in regard to examinations—I think it very much more liberal to those who have been in practice for six years.

Dr. LUCKEY. I think this discussion tonight will serve very much to let light in on this subject when it is published. Perhaps a good many other men have been befogged as to the requirements of New York state, as I have been. I do not think I have ever heard them so clearly set forth as tonight. I have applications all the time from men from New Jersey who want to interchange with New York, and I have been in the habit of stating the position to them entirely as I have apprehended the whole thing. When this is published I think it will do a lot of good.

Dr. Jarvie, with his illustration of our good friend Dr. Marvin, and the liberality of the state of New York toward all these people, is perhaps correct; but I think Dr. Jarvie would well bear in mind that the State Board of New Jersey is a very different board in its interpretation of its duties toward the practitioners who apply to it, than some of the state boards that preceded it. The board as now constituted has for its guidance the interpretation of the law not strictly by its letter, but by its spirit—the doing of the greatest good to every man who applies to it, who is entitled to *any* good. There are some things it shuts its eyes

to in the interest of humanity. The shutting of the eyes and saying "I am an officer of the law; I have no right to interpret this law" is not the attitude of the New Jersey board. They consult freely together, and I say to you openly and publicly that they interpret it liberally. The man who is afraid to meet the members of the New Jersey state board does not know the members of that board. If he is unworthy, he will be turned down without any hesitation; but if he has any worthiness, it will be considered to the fullest extent.

Dr. Ottolengui. There are a number of examiners present, and while it is not strictly in line with the subject, I would like to speak of some things I have asked about, and have not been able to answer.

The practical examination has been spoken of. Both New York and New Jersey exact the making or soldering in the presence of a member of the board, of a set of teeth on silver. If that is done to save the candidate the expense of gold, that is one point of view; but a gentleman who is a practitioner of repute in another state was in my office recently, and desires to come to New York. He has not been in practice six years, and must take the examination. He said very frankly: "I cannot solder a silver plate; but I will do a piece of bridgework or an upper or lower denture on gold." I said: "Certainly you can do it; there is no doubt in my mind about that. I think it is only a matter of economy." But investigation showed it was not so. He must make a silver plate; a thing a dentist never makes. You might as well be asked to put a hub on a wheel and unite the iron ends, or attach a shoe on the hoof of a horse. It is work we never do. Even in orthodontia it takes a great deal of experience to do it. Why it should be insisted upon, and he be denied a license if he cannot do it, is something I cannot answer.

Dr. F. C. Walker, Brooklyn. I am only a novice on the board. I know very little about its working as yet. When I have found out all the details of the law I will be pleased to express my opinion. I have found the board of examiners in the state of New York very liberal indeed. As far as my personal acquaintance with them goes, they have been inclined to help at all times rather than hamper a man. It is only those that show a radical deficiency that are turned down. As far as the New Jersey laws go, I think the idea of Dr. Stockton is very good. There ought to be a universal reciprocity law; but how it is to be brought about I am not well enough acquainted with details to argue or discuss.

Dr Gillett. It seems to me the idea Dr. Stockton has put before us tonight is a very desirable one; but there are practical difficulties in the way of obtaining its realization, many of which have been mentioned tonight. The examples Dr. Stockton cited should be most roundly condemned, if they are authentic. It astonishes me that any dental board today would take such a position as has been described.

I am a member of the Rhode Island State Board, and the final test in Rhode Island with a debatable candidate is "Is he safe? Will the public be safe in his hands?" Our laws do not permit us to give a special examination, but we do it in a sense. We ask the candidate to take the same examination, but a man whom we know is a reputable man and presents good practical work, and is strong in the work on so-called practical subjects, gets the full benefit of that strength to help him over the weak places, when he does not happen to remember the front names of the bacteria, as Dr. Ottolengui mentioned.

Two points will bear more emphasis. One is with regard to the difficulties in obtaining anything like uniformity in dental laws. We have had ample evidence of the difficulty in bringing about uniformity of opinion in the profession concerning laws. Those of you who have had experience in attempting to convince state legislatures of the desirability of even having any laws at all on certain subjects, or of amending existing laws to conform to the most intelligent opinion of the profession, will need no argu-

ment to convince you of the difficulties in the way.

Another point that has puzzled me a little in that connection has to do with the different classes of state boards with whom you have to deal. How are we going to regulate examining boards? If dental faculties do not live up to their requirements, and we have to have examinations to convince ourselves that they have done what they say they have done, how shall we find out what the dental board in some distant state has been doing? It is perhaps a subject that should be approached very cautiously; but I think any man who has had even one year's experience on state boards is pretty well convinced that some of the candidates who come before him with diplomas from certain dental schools never passed the entrance examinations that those dental schools publish. That is a very practical point in state board work. I believe it is a very practical point in dental legislation—the bringing of some of those dental schools up to their published requirements.

There are many difficulties confronting the state board that wants to do its full duty by the public.

Dr. J. H. Hanning. Dr. Luckey, I would like to thank you personally for coming over and stirring up the gentlemen in the audience. I have been wondering just what the clause meant. Dr. Jarvie explained it very well tonight. As I understand this interchange law, I cannot go into New Jersey and practice. I cannot go to the regents and take the preliminary examination without a certificate. There is this much about it. The board of regents should have absolute power to set a preliminary education for the entrance of every man into college; but I do not think that New York is doing itself credit when it accepts the domination on the part of the regents over its examiners. No man on the board knows what a dentist should know, or what his requirements should be.

The President. The chair will have to call the speaker to order. That point is not well taken, because that is not the present procedure.

Dr. Hanning. A man can come here and take an examination if he has been in practice six years, presumably from New Jersey; but he must then go to the regents, and they will have the final say as to whether he should have his certificate or not.

Dr. Jarvie. Oh, no; not at all. He goes to the members of the state board.

Dr. Hanning. The regents have the final say, have they not?

Dr. Carr. No; they keep it as a public record.

Dr. Hanning. I have been laboring under the idea that since 1896 the board of regents have control over the medical and dental examinations.

Dr. Luckey. That is the same idea I had.

Dr. Perry. I have no opinion on this subject. I do not need to have. With these young, vigorous gentlemen on both sides, the interests of the profession will be protected. With the oratory of New Jersey and the logic of New York, I think we can rest secure and be assured the interests of the profession will be cared for.

Dr. Meeker. As this will probably be a matter of history, I wish to place New Jersey in the right light in regard to Dr. Marvin. Dr. Marvin did not come for the regular examination with the young gentlemen who composed the class at that time. He received all that his years and ability should be credited with. He came on an evening, and he was not subjected to an examination as the others were. It was an informal examination; more in the nature of a social evening spent with the board of examiners at their office. We all know Dr. Marvin's fitness to practice dentistry, and there was no regular examination. He looked over the papers that happened to be there, and offhand answered them. We all recognized his ability. I would have spoken to Dr. Stockton about it had I seen the statement in his paper earlier. I wish it to go out to the world that the New Jersey State Board recognized Dr. Marvin's ability as a dentist.

The suggestion of Dr. Jarvie regarding a national board—brought up before a

meeting once before, when he was a member of the National Association of Examining Boards—never seemed to me would be practicable, because to obtain it you would have to change the laws of every state, and while you were doing that you could get the Asheville resolution throughout the country. You would be going over all the work that has been done in the last twelve years—since I have been on the board at least.

Dr. Jarvie brought up one bad feature of interchange—where a gentleman came before the New Jersey Board and was rejected. I forget whether he was a graduate of Pennsylvania or New York—I think it was Pennsylvania—and Pennsylvania of course reciprocated with New York. So he came to New York and received a license to practice in New York, and immediately went to New Jersey. We had an interchange with New York that was specific, and we could not go back upon it, and we gave him a license to practice in the state of New Jersey. If we had had the Asheville resolution it would have been different.

Dr. JARVIE. It could not take place under the present conditions, because each board must report to the other boards the names of all those who failed in the examinations.

Dr. CARR. On cross examination of the doctor, I find that the candidate failed to pass the New Jersey Board examinations some three years ago, and recently passed our board. Well, why not? Has a man no right to take a second examination, having failed in the first, particularly if he studies three years for the examination? It would not be just to debar him from examination simply because he failed in a previous one.

Dr. OTTOLENGUI. I would not bar him from getting a license in New Jersey, but I would bar him from coming to New York and getting a license, and then going to New Jersey on the strength of it.

Dr. MEEKER. This new Asheville resolution is known to work a great good throughout the country, because with the two clauses in it no one can get an interchange of license unless he is perfectly competent. I have been on the board fourteen years, and I have been in the National Association about that time; and I have always said that the boards have nothing to do with the curriculum of the colleges. It is the product that comes before the boards. No matter whether they have a tuition of one year, or six months, or ten days, if they come before the board and can answer all the questions, the New Jersey board will pass them.

Adjournment.

WM. B. DUNNING, D.D.S.,
Editor N. Y. Odont. Soc.

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PHILADELPHIA, SEPTEMBER 1905.

EDITORIAL DEPARTMENT.

THE BUFFALO MEETINGS.

THE annual sessions of the National Dental Association, the Faculties Association, and the National Association of Dental Examiners occupied something over a week of time in their collective deliberations at Buffalo, N. Y., and while good results undoubtedly were attained in several directions, the conviction seems to be a growing one that certain improvements ought to be made in order to increase the efficiency of these gatherings, and relieve them of the fatigue and weariness incident to the present system and time of holding them.

When it is considered in the first place that scarcely two per cent. of the dental profession of the United States attend the National dental meeting, that fact in itself is one which should not only command attention but stimulate the development of ways and means to increase the general interest in the National body and augment its membership. There has recently been held at Portland the Pacific Coast Dental Congress, with an attendance practically equaling that of the National Dental Association at Buffalo. The anniversary meeting of the Odontographic Society of Chicago a few years ago surpassed, in numbers attending, any other dental gathering up to that time. All of which goes to show that dentists will attend meetings when they find suffi-

cient justification for so doing. Each largely attended meeting that may be classed among the successful meetings has achieved the result by an efficient organization of its working forces, beginning the work well in advance and carefully selecting the features of the program, making it attractive and comprehensive and of such interest and merit as to induce the profession generally to attend.

The explanation is frequently made that the average dentist cannot afford the monetary loss and outlay incident to attending meetings, especially when a considerable amount for traveling and hotel expenses is involved. As a matter of fact, however, these elements have not operated to diminish attendance when the attractiveness of the program or of the general features of the meeting have been such as to justify the personal outlay.

The program of papers is by no means, as a rule, what it should be, simply because the obvious necessity for essays as a feature of the program creates an imperative demand which a committee is compelled to supply; hence papers are solicited and too often written merely to fill space and occupy time, and the committee having solicited the essay feels morally or by courtesy bound to accept it and place it upon the program, and the essayist too often feels that he has done the committee, or even possibly the association, a favor by reading it. This kind of attitude needs to be eliminated and the reverse order established. A properly constituted board of censors should be created, one in whose fairness and critical ability the profession at large would have confidence, and to such a committee all essays should be submitted before being placed on the program, and no paper should be so placed unless worthy of that distinction. Were such a system of rigid and intelligent censorship of the literary and scientific part of the program enforced, it would in time come to be a distinctive honor to all essayists whose productions had been accorded a hearing by the National Dental Association, besides stimulating the output of good papers to compete for that honor, and, not less important, it would add greatly to the interest and value of the meeting itself.

Another feature which it would seem ought to be carefully considered is the division of interest and consequent dissipation of energy which necessarily results from the holding of the three principal National dental gatherings during the same week. In past times when the aggregate amount of work of all three bodies was such as to be readily compassed by one man's mind, the conflict of three important interests was not a serious matter, but in the present stage of development of the problems of dental education and of dental legislation either of them is of sufficient magnitude and intricacy to demand the undivided thought and attention as well as the best effort of those who make these problems their special concern. The same is equally true of questions of practice and of a scientific nature that are presented for consideration at the National Dental Association meeting. These several lines of activity are distinct and should not be brought together in a hodge-

podge of confusion during a single week at the end of a whole season's professional work.

The Faculties and Examiners should hold their meetings during the active teaching season—for example, during holiday week or about that time, when their special problems could be intelligently discussed while fresh in mind. These two associations should meet simultaneously, so that conferences to their mutual advantage could be arranged and held. While they differ as to means and method, their objective ends are identical, and a better mutual understanding would eventuate in better results to education and to legislation respectively by the plan here suggested. This would leave the work of the National association unhampered by diverting interests and concentrate the whole energy of the membership upon the work in hand.

It may be objected, as indeed it has been, that men will not take the time nor incur the expense to attend two annual meetings during the year. We regard this as purely fanciful. Members of the college faculties are now in the habit of attending the Institute of Pedagogics during holiday week as well as the National in summer—so that the problem has practically solved itself on that point. We believe that the division of meetings suggested is well worthy of a trial, and that it will be found to be not only practicable but productive of better results in all the departments involved.

The sectional division of the National meeting was not in our opinion altogether a success, for obvious reasons. Yet there seem to be but two alternatives—either to hold the section meetings serially or else to return to the old plan of general meetings exclusively. By the latter the number of papers that can be heard and discussed is necessarily greatly limited; by the simultaneous sectional meeting plan two-thirds of the papers are lost to the individual member. On the whole it would seem best, for the present at least, to adhere to the sectional division, but to present the sectional matter serially in general meeting and to limit the number of essays rigidly within the time of the meetings by selecting only the most interesting and meritorious for presentation, assigning this important work of censorship of papers to a special committee, as already referred to.

REVIEW OF CURRENT DENTAL LITERATURE.

Conducted by JULIO ENDELMAN, D.D.S.

[*Revue Trimestrielle Suisse d'Odontologie*, November 1, 1905.]

PAPILLOMATA OF THE TONGUE. By Prof. Berger, of the Hôpital Necker.

The author reports the case of a young girl, aged fourteen, who presented upon the dorsum of the tongue a strawberry-shaped tumor, flattened on the upper part and adhering to the tongue by a pedicle.

The tumor developed rapidly, having acquired that comparatively large size inside of four weeks after its first appearance. A diagnosis of epithelioma could not be established for the reason that this variety of tumors never develops upon the median line of the tongue and, furthermore, because such objective symptoms as papillary swellings around the pedicle and indurated mucous membrane with white leucoplakia spots were entirely absent, and the tumor itself was neither friable nor did it have any tendency toward bleeding. It was not a syphilitic condyloma, as tumors of this variety never develop singly, and their appearance is always accompanied by a fissured condition of the tongue, mucous plaques, and without the silvery appearance of the tumor under consideration. The probability of the tumor being of a tuberculous nature was also entirely eliminated, as these usually develop upon an ulcerated base.

Having excluded the malignant tumors, the next step in the diagnostic study consisted in ascertaining to which variety of the benign group the tumor could belong. It was not a cyst, a lipoma, or a fibroma, tumors which evolute under the mucous membrane, but unquestionably a papilloma. In this connection the writer calls attention to the necessity of classifying papillomas not under the group of benign tumors, but under that of the malignant variety, as they not infrequently become eventually transformed into sarcomas and epitheliomas. The removal of a papilloma should imply something more than the ligating of the pedicle. The tissues at the base of the pedicle should be cut out, including part of the underlying muscular tissue, and the wound should be closed by means of sutures. Such operations may be performed under cocain anesthesia.

[*l'Odontologie*, Paris, July 15, 1905.]

NOTES UPON A SPECIAL FORM OF PSEUDO-ODONTALGIA OF GRIPPAL ORIGIN. By Dr. Maurice Roy, Paris.

In 1890 Dr. Lecaudey called attention to the buccal manifestations of grippe. Hugenschmidt in 1892 described a type of ulcerative stomatitis and gingivitis and other occasional oral symptoms of grippe which he had observed during two recent epidemics. Dr. Roy describes a form of pseudo-odontalgia consecutive to grippe which he has observed in a number of patients during the past winter. Many authors have already described a certain type of neuralgia of the trifacial nerve following attacks of grippe, but all these cases seem to have been of the non-localized type. Dr. Roy's cases in contradistinction to those previously described were localized around the region of the upper molars of the right side in some cases and of the left in others. As the teeth in the affected region were free from caries excepting perhaps one or two small cavities of the second degree, which had been filled, and as the absence of other characteristic symptoms eliminated the possibility of locating the cause in the teeth, the author found it necessary to proceed with his diagnostic study in a different direction. Upon close questioning he found that all his neuralgic patients had suffered from attacks of the grippe, and some had a slight coryza even at the time of consultation. As there was a marked sensibility to pressure in the region of exit of the infra-orbital nerve to the exclusion of the

other areas supplied by the trifacial, the author diagnosed the disturbance as neuralgia of the infra-orbital nerve through maxillary sinusitis of grippal origin. No local treatment was instituted, as all the patients recovered after having taken for a few days the following combination:

℞—Antipyrini,	ʒjss;
Quininæ hydrobrom.,	gr. xxxvj. M.

Sig.—One every three hours.

For application within the nose the following was prescribed:

℞—Mentholis,	gr. x;
Acidi borici,	ʒiij;
Vaselini,	ʒj. M.

Sig.—To be applied within the nostrils on rising and retiring.

[*Schweizerische Vierteljahrsschrift für Zahnheilkunde*, January 1905.]

NEURASTHENIC ODONTALGIA. By Dr. S. Dunogier.

Several authors, and in particular Valliex ("Traité des Névralgies," Paris, 1841) and Grisolle (*Journal des Connaissances médico-chirurg.*, 1845) have excluded from their definitions of neuralgia all references to lesions upon the nerves which are the seat of pain. Professor Jendrassik believes that the true type of neuralgia is rarely observed, but admits that those of the trifacial exhibit the characteristics of the true type and those about other nerves are but pseudo-neuralgias, symptomatic of neuritis and in some instances of lesions of the nerve centers.

Neuralgias of the fifth pair may be localized upon the face or in the gingivo-dental region. Those which the author designates as neurasthenic odontalgias are localized upon the gingivo-dental region and manifest themselves by continuous excruciating pain —the contrary to what occurs in the ordinary type of odontalgia, where the pain is paroxysmal rather than continuous. In neurasthenic neuralgia there is generally a tendency for the pain to spread so as to involve other nerves, and at times it fluctuates from one side to the other. Furthermore, they are characterized by the entire absence of objective symptoms always present in odontalgia of dental origin.

It is almost superfluous to dwell upon the importance to the dental practitioner of being able to properly diagnose the varieties of odontalgia encountered in the course of dental practice. There are a number of cases on record in which pain having become localized upon the teeth, these organs have been uselessly sacrificed, and in a case reported by Frederich (*Deutsche Zeitschrift für Chirurgie*, 1899, vol. lii, p. 366), not only the teeth were extracted but likewise the Gasserian ganglion, but all to no avail, as the pain was but partially and temporarily relieved.

[*Deutsche Monatsschrift für Zahnheilkunde*, March 1903.]

A CASE OF HEREDITARY SYPHILIS OF THE MOUTH. By Dr. M. James.

The author reports the case of a woman aged thirty who consulted him regarding an acute pain localized upon all of the upper incisors. The patient informed Dr. James that previous to the onset of the pain she had received a blow upon the upper jaw. Consequently it was natural to presume, as did Dr. James, that the pain was the result of this traumatism. The gums were deeply inflamed and the upper right central incisor protruded slightly from the alveolus. An incision was made in the gum over this incisor and was followed by the discharge of a small amount of purulent matter. The area was explored through the opening thus made, when it was found that the hard tissue of the jaw was the seat of inflammatory phenomena. The lancing and removal of the pus did not result in any improvement whatever, but on the contrary shortly after the intervention the pain became almost unbearable. The maxilla necrosed, and as a consequence of this the author found it necessary to extract three of the upper incisors. Several sequestra were removed, but still conditions remained *in statu quo*. By this time the author began to suspect that the cycle of disturbances was due to syphilis, and upon close questioning the mother and the obstetrician who had been in attendance at the child's birth, found that during the period of gestation she had suffered several times from grave syphilitic manifestations. In accordance with this almost positive diagnosis a specific treatment was instituted and it was not long before the patient recovered entirely.

[*La Odontologia*, Madrid, July 1905.]

TREATMENT OF ALVEOLAR FISTULA.

By Sr. E. Cortiguera.

The author has devised a method of treating alveolar abscess with fistula, upon which he reports most satisfactory results. After cleaning out the pulp-chamber and canals in the customary way, he introduces into the cavity, as far as the entrance of the canal, the needle of a strong and resistant metallic syringe, and fills the cavity with cement mixed thick so as to prevent the possibility of its penetrating the canal and clogging the opening of the needle. The purpose of filling the cavity with cement is to prevent absolutely any of the fluid which is to be injected into the canal and fistula from escaping into the mouth. By this means it becomes a simple matter to force any solution into the infected area and to bring about a return to normal in a very short time. The antiseptic solution employed by Sr. Cortiguera is the one suggested years ago by Professor Viau, and is as follows:

Crystallized phénol,	gr. iv;
Menthol,	gr. viij;
Absolute alcohol,	fʒss;
Hydrogen dioxid,	fʒv.

[*Revue de Stomatologie*, Paris, July 1905.]

TREATMENT OF NEURALGIA BY THE INJECTION OF ALCOHOL AT 60° C.

By Dr. Sondaz, Orleans, France.

During May 1902, Dr. Verger in collaboration with Professor Pitres presented a communication to the Société de Médecine et de Chirurgie de Jonzac on the subject of alcohol in the treatment of severe facial neuralgia. Dr. Tourtelot of Royau discussed the subject at the Fourteenth International Congress of Medicine, reporting four cases of severe facial neuralgia cured in three or four days by injections of alcohol at 60°, after having exhausted the long list of therapeutic agents usually available in cases of this sort. Dr. Bruske of Amsterdam (*Revue de Stomatologie*, September 1904) reported several cases cured by this method. Dr. Laporte, in his thesis recently published, describes twelve cases of neuralgia of old standing successfully treated by injections of alcohol, either *loco dolenti*, according to the method suggested by Pitres and Verger, or deeply into the tissues, according to Dr. Ostwalt's technique.

In the present communication Dr. Sondaz reports two successful treatments. His technique is indeed simplicity itself. By means of an ordinary hypodermic syringe he injects into the skin or mucous membrane from where the pain seems to originate, one cubic centimeter of alcohol at the temperature of 60° C. The introduction of the alcohol into the tissues causes a slight humming sensation and swelling of the tissues around the area of injection. In some cases two injections had to be performed at intervals of a week or more, but the author feels confident that by means of this method the pain disappears completely—if not forever, at least for a long enough period to warrant its employment.

[*Bulletin de la Société Belge de Stomatologie*, Bruges, February 1905.]

BUCCAL TUBERCULOSIS. By Dr. H. Allaeys.

The author describes a case of buccal tuberculosis in which the ulcerations were situated on the mucous membrane of the cheeks opposite the molar teeth. They were superficial, extremely painful, with salient borders of bluish color, and with sero-purulent bases. While there was no element of doubt regarding the nature of the ulcerations, it was interesting to observe that the area around the ulcerations did not present those small elevations—*points de Trélat*—which have been heretofore considered as pathognomonic of tuberculous ulcers. The appearance of tuberculous lesions in the mouth is a very grave symptom of the general condition of the patient, as they always appear concomitantly with a pronounced aggravation of the general infection. The case under consideration, which was that of a woman aged thirty-four, terminated fatally, notwithstanding careful medical and surgical attention, and exemplifies the serious character of tuberculous lesions about the mouth, not so much *per se*, but by reason of the aggravation of the pulmonary infection which takes place hand in hand with their appearance. Tuberculous lesions are *per se* difficult to diagnose, but as they develop in connection with pulmonary tuberculosis, the task of ascertaining their true nature is rendered less problematic, although we should not lose sight of the fact

that in patients even tuberculous, ulcerations of polymicrobic nature may develop upon the mucous membrane which, while they may simulate the tuberculous ulcer, are in no way whatever the outcome of local infection by the bacillus of Koch. In the treatment of these ulcers neutral or slightly alkaline antiseptics should be preferred to the acid and alcohol preparations, which instead of benefiting the patient cause further irritation and pain.

[*Odontologische Blätter*, Berlin, July 1905.]

TREATMENT OF THE DISEASES OF THE SOFT PARTS OF THE TOOTH. ELECTRO-STERILIZATION IN GANGRÆNA PULPÆ. By Dr. Josef Peter, Vienna.

Electro-sterilization has been known for a long time, but it is not as yet a universally adopted method.

Experiments upon the action of antiseptics have been made in large numbers, but not many have given a reliable result, even in the test tube. In practice, pretty much all of them leave us in the lurch at times, especially when we are dealing with ill-formed, twisted roots, with narrow, partially obliterated canals, as is not very rarely the case with molars and occasionally also with the first upper bicuspids.

A permeable apical foramen constitutes likewise a very undesirable complication; and still more troublesome are the results of pulp gangrene in the pericementum.

At the time when much experimentation was carried out in cataphoresis, with the object of inducing dentinal anesthesia, attention was drawn to weak galvanic currents and their products. It was, in fact, a very interesting question, especially in reference to the ultimate fate of the products of the electrolytic action. Modern chemistry employs electricity, with special preference for the generation of chemical processes, and we shall see that the dentist has certain special reasons for this preference.

Apostoli and Laguerrière, Prochownik and Späth, Spilker and Gottstein, Verhoogen, Krüger, Thiele, and Wolf have been active in determining the effect of the electric current of greater voltage and higher intensity (50-300 milliamperes). This procedure is not of course applicable to our purpose; still these researches have led to important results, especially those of Thiele and Wolf, of great importance to dentists.

Breuer was the first to study the effect of the weak galvanic current, carrying out his experiments with Kretz, in 1890, upon staphylococcus cultures. The passage of a current of weak voltage resulted in the production of a sterile region in the immediate neighborhood of the anode after the action for five minutes of a 1 milliampere current. Since that time he has also employed the electric current for disinfecting root-canals. Breuer also in 1894, in conjunction with Ghon, examined the effect of galvanic currents of low voltage upon the diplococcus pneumoniæ. The current in this case was also effective when possessing an intensity of 1 to 1.5 milliamperes.

The effect could be increased decidedly by making a channel in the culture medium, filling it with a solution of sodium chlorid, and dipping the anode into it. The cathode was always ineffective. In accordance with these experiments, Breuer employed fine platinum needles wrapped in cotton saturated with a solution of sodium chlorid as the anode for the disinfection of putrid roots. The chlorin liberated at the anode has a very intense action; nevertheless, he finds that the method is difficult of application where the canals are narrow.

Wolf decomposes sea-water by the current and employs it as electrozone. He describes the action as follows: In consequence of a strong current, chlorin and oxygen are formed at the positive pole, sodium at the negative; hydrogen is set free; the oxygen and chlorin unite with the alkali, forming sodium hypochlorid. Hypochlorids are very active germicides. The chlorin unites with the hydrogen of the organic body, setting free an atom of oxygen. It unites also with the hydrogen of the surrounding fluid, again liberating an atom of oxygen; the third oxygen atom is obtained from the decomposition of the hypochlorid; the three oxygen atoms form ozone.

Simpson employs a galvanic current of from 1 to 5 milliamperes for the treatment of inflammation of the peridental membrane. It is possible in this way to prevent the formation of an alveolar abscess.

Kirchner decomposes iodoform within the

root-canal by means of the current; the resulting vapor of iodin is an efficient disinfectant.

Bethel employs silver nitrate for the sterilization of root-canals. He gets a combined effect of electrolysis and cataphoresis. The remedy penetrates into the canaliculi of the dentin, where it can be seen with the microscope. He emphasizes the advantage of this procedure in that it makes possible the sterilization of roots which are inaccessible to instruments; he employs it especially in posteriorly directed canals which are very narrow, angular, or twisted, and so impassable for instruments.

Zierler and Lehmann tried the effect of a current of 3 to 3.5 milliamperes upon anthrax bacilli, micrococcus pyogenes aureus and albus, bacterium coli, and finally—their spores being extraordinarily resistant—upon the bacillus gangrænosus pulpæ (Arkövy), with the following results: "Two milliamperes acting for ten minutes created at the anode a sterile region from 1 to 1.5 cm. in diameter according to the thickness of the agar. With 30 milliamperes a clear sterile region appeared about the point of application of the anode never less than three centimeters in diameter with normal thickness of agar"; gangrenous roots treated for ten minutes with a 3-milliampere current were also sterilized, at least as regards their contents. Zierler reports over 1800 cases in which he employed electro-sterilization. The term electro-sterilization is of his creation. His results were entirely satisfactory.

Lately Hoffendahl has published his observations. His experiments confirm Zierler's results as well as Breuer's. He employs in practice an intensity of 1.6 milliamperes for five minutes and repeats the sitting once, and in many cases even twice. Teeth so treated were found upon examination to be sterile. He has also described a very handy apparatus which connected with a street current is very useful in practice.

The author has had experience with but a small number of cases—thirty-four* in all—an insignificant number in comparison with Zierler's. The treatments were carried out between November 12, 1904, and March 2, 1905. Small as the number is he believes that it is not without value, for the result was excellent in every case. More than half the roots treated presented complications such as apical pericementitis. The treatment was completed in every case by a single sitting, subjecting each root separately to Zierler's experimentally determined quantum of thirty units (milliampere-minutes), immediately followed by filling the roots. In order not to prolong the sitting unduly, the crown filling was inserted at another sitting, generally the next day, without, however, touching the filling of the root.

The investigations which have been carried out up to date by several authors have led Dr. Peter to formulate the following conclusions:

(1) In the treatment of infected roots the electric current is effective only through its electrolytic action.

(2) The electrolytic effect, as also the disinfecting power, is the greater, the stronger the current and the stronger the concentration of the electrolyte (Bethel).

(3) The thirty units (milliampere-minutes) given by Zierler are sufficient, if a solution of common salt be used, to render the root-canals sterile.

(4) Impermeability of root-canals is no contra-indication to the method.

(5) Solution of common salt is a suitable electrolyte.

(6) Apical inflammations of small extent are curable by the method of Zierler, Hoffendahl, and Peter.

*"Since writing the above," he says, "I have had a few more with the same result."

[*British Medical Journal*, March 25, 1905.]

SCOPOLAMIN AS A GENERAL ANESTHETIC. By Dr. Terrier.

Terrier in a report on the use of scopolamin as a general anesthetic in surgical practice publishes the results of twenty-six trials with this agent. The anesthetic properties of scopolamin were brought under the notice of French surgeons by Desjardine. It is extracted from Scopolia japonica, and is chemically identical to hyoscin, although possessing different physiological action. The injection of a solution of a milligram of scopolamin with a centigram of morphin in a cubic centimeter of distilled water, when followed by a second injection after an interval

of two hours and by a third after a further interval of one hour, brings about in the course of half an hour after the first injection a deep but quite natural sleep. After the second injection the reflexes are diminished and the pulse is accelerated, and the third injection is followed by still deeper but quite physiological sleep and by dilatation of the minute vessels of the face and full, regular, and rapid pulse. The anesthesia thus induced, which is complete, lasts for four or five hours. Anesthesia persists for some time after the renewal of the cerebral functions, so that the patient remains comfortable and free from pain in the wound for the first twenty-four hours after the operation. There is freedom from headache, nausea, and vomiting. The advantages of inducing general anesthesia with scopolamin are pointed out by the author as follows:

(1) It suppresses any apprehension of the operation. (2) The state of anesthesia is not preceded by excitement, thus avoiding a cause of syncope. (3) The nausea, vomiting, and malaise which so often follow other methods of producing anesthesia are not observed after the use of scopolamin. The patient awakes in a normal manner from his deep sleep and is able at once to take liquid and solid nourishment. (4) The persistence of anesthesia after the awakening enables the patient to pass the night in comfort and in freedom from pain at the seat of operation. (5) The injections are not followed by albuminuria. (6) The agent does not act on the heart or lungs and causes no bronchial irritation.

The disadvantages are: (1) Scopolamin is very uncertain in its action, and it becomes sometimes necessary to have recourse to chloroform anesthesia. (2) It is a very unstable substance, so that it is necessary to use only fresh and pure solutions.

Another marked disadvantage of scopolamin is its effect upon the bloodvessels. It is a vaso-dilator and therefore increases the tendency to hemorrhage during the operative intervention. It is contra-indicative of abdominal surgery, as it produces a degree of contraction of the abdominal walls. This complication, the author thinks, might be prevented by making only one subcutaneous injection of the solution.

In conclusion, the author states that scopolamin possesses a great advantage over other anesthetics in being absolutely free from danger.

[*Le Monde Dentaire*, Paris, June 1905.]

TREATMENT OF ODONTALGIA WITH CHLORAL HYDRATE. By Dr. Rabbagliette.

The author reports on the successful treatment of odontalgia by means of chloral hydrate. He employs a solution of fifteen parts of chloral hydrate in one hundred of glycerin. A pellet of cotton is saturated with the solution and is carefully introduced into the painful cavity. The pain ceases at once.

[*American Dental Journal*, July 1905.]

ALVEOLAR ABSCESS, ITS COMPLICATIONS AND TREATMENT. By Dr. Thos. L. Gilmer, Chicago, Ill.

The author states that what we understand pathologically by an alveolar abscess is that which has but one origin, namely, from poisons produced through putrefactive changes of the contents of root-canals, and in its incipiency it is always restricted anatomically to the peridental membrane in the apical space of the root-socket. The pseudo or lateral abscess described by Black has its origin in the peridental membrane, but its cause does not depend on the disintegration of pulp tissue but upon traumatism or other causes extraneous to the canals. In such cases the pulp may be alive and free from pathological infection. The first stage in the cycle of changes leading to the formation of an alveolar abscess is a hyperemia of the pulp. If the inflammatory condition should continue it will lead gradually to pulpitis, pulp necrosis, and pulp putrefaction. During pulp putrefaction poisonous ptomains are formed which, passing out through the apical foramen into the apical space, cause a degree of pericemental inflammation, which may result in the formation of an alveolar abscess. The author then describes that form of alveolar abscess caused by infection of the mummified contents of root-canals by micro-organisms which have gained access to the canal through the circulation. He also describes the local and systemic symptoms of alveolar abscess.

Referring to the direction in which the pus finds an outlet, Dr. Gilmer states that

in some rare instances the pus burrows and finds an exit at a point remote from the seat of the abscess, *i.e.* in the chin, neck, cheek, and in a case which came under the author's own observation, recently, a fistulous tract opened in the neighborhood of the clavicle. Black has reported a case in which the pus pointed externally just under the malar bone, the abscess originating in an upper molar.

Alveolar abscess may lead to necrosis of the jaw, and in one case in the writer's practice an abscess caused by an impacted third molar caused a necrosis necessitating the removal of one-half of the mandible. Discussing the complications of alveolar abscesses it is stated that they may induce maxillary sinusitis and infection of the nasal fossa. In this connection the author describes the condition leading to the transformation of alveolar abscess from a stage of acuteness to one of chronicity. Chronic abscess when in the upper jaw may result in caries of the bone about the end of the root of the offending tooth; and here he calls attention to the difference between caries and necrosis of the bone. Caries is a suppurative osteitis, causing the destruction of the bone cell by cell, while necrosis destroys it in a mass as a result of the blood supply being cut off from the part.

After describing his method of treating septic pericementitis and in connection with the therapeutics of root-canal infection, the author warns practitioners against injecting hydrogen dioxid in root-canals, because of the probability of carrying infectious material beyond the original localized area. If the ordinary treatment for chronic alveolar abscess should fail, the author recommends opening the alveolar walls to remove the necrosed portion of the root. If a chronic abscess has a sinus, the primary treatment is the same as in the so-called blind abscess, only that the antiseptics may be forced through the canals into the abscess and out through the sinus. For this purpose the old remedy, carbolic acid 95 per cent., may be employed, following it up by an application of alcohol to offset the escharotic effect of the acid. If there should be caries of the bone as a result of the abscess, the discharge will be serous, with only a limited amount of pus. Such cases do not as a rule yield to treatment through the canals as do usually the cases where the root is denuded and roughened by absorption. To cure the condition the root should be resected in addition to the removal of the carious bone, and the pocket cavity irrigated with antiseptics and packed for a time with iodoform gauze. The pocket should be irrigated daily after the treatment and repacked with gauze until healthy granulations form. This treatment is applicable to incisors, canines, and bicuspids, the buccal roots of the upper first and second molars, and also occasionally to the lingual roots of these molars. If it is a lingual root of an upper first or second molar which causes the disease it is generally best to resect the entire root at the bifurcation, as these teeth will do well and last many years, affording good service with the two buccal roots only remaining.

In some instances the entire root of the lower first or second molars may be removed and the teeth will still do good work. To resect the root of the central incisor, a curved incision is made on the gum with its convexity downward, the flap is turned up and the bur is carried through the thin layer of bone if it has not already been destroyed by disease, as is the case in many instances.

After having exposed the root, with a bibeveled drill, drill regularly through the root, then with a cross-cut fissure bur introduced into the drill hole cut from right to left until the apex is severed. The end of the root is then turned out and the carious bone treated as before indicated.

PERISCOPE.

Freshening Plaster.—Dental plaster which has gathered moisture can be freshened and slaked by heating a brick to almost red heat and burying it in the plaster.—*Tri-State Dental Quarterly.*

Ichthyol for Inflammatory and Septic Conditions.—Ichthyol is a most valuable substance to reduce inflammatory swelling and in septic conditions affecting the skin. Its disagreeable odor is very distressing to many patients, but it can be concealed by the addition of oil of citronella, 20 minims to the ounce of ointment. Oil of roses also does well, but is very expensive.—*Med. Standard.*

Some Chinese Medicines.—Many absurd beliefs recorded in the Chinese materia medica are set forth by S. Synge (*Dublin Journal of Medical Science*). Iron sulfate is said to go at once to the liver and gall-bladder, and to be good when the liver is inflamed; it is also good for cough, epilepsy, hematuria, etc. It is said to be obtained from copper pits and to be the fluid part of the copper, thus enabling it to go to the liver. The color of the best preparation should resemble the inside of the mouth of a green frog. The human placenta is said to cure weaknesses, thinness, wasting diseases, madness, and epilepsy; it should be taken from a healthy primipara, washed in a running brook, then boiled, after which it may be toasted or powdered, or eaten after the boiling with rice. Powdered tiger-bones are thought to give strength. The urine obtained from the white horse, the ass, and children is given in fevers. Another absurdity recorded is that when a placenta does not come away it goes up into the woman's chest and suffocates her. It is also believed that the milk comes into a mother's breast with the incoming of the tide.—*Medical News.*

A Warning.—Having noticed from time to time that gold fillings and gold crowns which had been nicely finished would come back to me with a dull brassy appearance, some looking as though they had been sandpapered, I began to investigate the cause, and discovered it to be coarse tooth-powders and pastes. I have tested many, and find that about half of those in the market about here are so gritty that they will in a single thorough brushing of the teeth remove all polish from gold, and in a short time cut away exposed cement fillings badly. Some are exceedingly gritty, and without question their use accounts for the deep grooves we often see across labial and buccal surfaces of teeth. In many cases the scratched gold fillings will retain a slimy deposit, making a home for bacteria; just the conditions to lead to decay about their edges. Almost daily I am seeing evidence of the use of these gritty powders, and never fail to find upon inquiry that the patient is using one of the preparations that I have tested and found bad. A fine powder that will keep gold fillings bright and clean will do the same for teeth. I deem it my duty to call the attention of my fellow-dentists to this matter, that they may be on the watch, and may warn patients for their good, and protect their own work.—N. J. Goodwin, Hartford, Conn.

Origin of Atmospheric Formaldehyd.—Gautier, Henriet, and others have shown that the air of towns almost always contains formaldehyd. M. Auguste Trillat finds (*Bull. Soc. Chim*, 1905, iii, 33, p. 386) that this formaldehyd originates by the combustion of a great variety of organic materials, such as wood, paper, coal, peat, petroleum, and tobacco. Small quantities of formaldehyd are produced by the combustion of these materials in glass tubes, and much larger quantities when they are burned in iron vessels, as the result of the catalytic action of the metal; thus a kilogram of coal gave 7 mgm. of the aldehyd when burned in a glass tube and 250 mgm. when the combustion took place in an iron stove. Similarly the author traces the efficiency of burning sugar, juniper-berries, incense, and similar fumigating agents to the presence of formaldehyd in the smoke. The aldehyd can readily be detected in town air by exposing slips of bibulous paper previously dyed with rosaniline hydrochlorid; the paper develops a blue color in the course of an hour or two when formaldehyd is present. In 100 cubic meters of air, from the roof of the Pasteur Institute, Trillat obtained 24 mgm. of formaldehyd,

while a similar quantity of air tested halfway up the building yielded 31 mgm., and 100 cubic meters of air examined at Courbevoie, in the environs of Paris, gave as much as 55 mgm.—*Chemist and Druggist.*

Crown-Making Suggestions.—After preparing tooth, taking measurement, etc., fit the band in usual manner, except to have top of band perfectly level, as it will have to abut a flat surface. Solder band with 20-k. solder. Now take an impression of the crown and adjoining teeth, also one of occluding teeth, and mount on a crown articulator. Carve the cusps to articulate, and take an impression of them in an investment material, such as sump, etc., being careful not to have the investment material above the joint of wax and gold. Mold a die of Melotte's metal, after which make a counter-die, preferably in lead; stamp up the cusps, cut surplus gold away, place the cusps in previously-made plastic impression, and fill level with 20-k. solder with the aid of a blowpipe. File the soldered surface level, so that it will have a perfect joint with the band. Place the band on the model, insert a piece of wax, then warm cusp so it will adhere to the wax, and place it in position. If you have been careful you will then have a perfect articulation. Take the crown and wire it while cusps are waxed in position, melt the wax out, and solder with a small piece of 18-k. solder, being careful not to fuse the 20-k. solder. It is obvious that the cusp filled in this manner is advantageous over the method of filling cusp and soldering it to the band at the same time, by the absence of solder on the inside of band, which is annoying, especially in molar crowns with a narrow band, because of a close bite.—E. T. Hedlund, *Dental Summary.*

Where Extraction is Justifiable in Connection with Orthodontic Operations.—First: Where both the upper and lower teeth on one side of the arch are in normal position and relation, while on the other side we find a canine standing entirely outside of the arch with no space in the arch for its accommodation. In such cases, if the overbite of the upper centrals be normal and the bicuspids and molars on the affected side be in advance of their normal positions but in fairly good occlusion, we believe that the extraction of a first bicuspid would not only be permissible, but would in reality be the best plan to pursue. The shifting of the median line slightly to the side where the extraction has taken place would be of little moment, for it would scarcely be noticeable, and therefore should not deter us from accomplishing that which we could not well otherwise accomplish.

Second: Where the harmony of the features would be satisfactory save for the protrusion caused by both outstanding canines, it is obvious that the extraction of the first bicuspids would be infinitely better than to enlarge the anterior portion of the arch and thus produce an unnatural fulness of the lip. The same may be said of cases where both the upper and lower arches are similarly affected. Under such conditions the extraction of all four first bicuspids would be called for in order to prevent anterior protrusion of both arches.

Finally, it may be said that the orthodontist must decide for himself whether he proposes to base his treatment entirely upon the attainment of the ideal, or whether he will be satisfied in many cases with results less than ideal but harmonious and satisfactory from a practical standpoint. If the former, he may often save all of the teeth but fall short of attaining results that are entirely satisfactory; if the latter, he will occasionally sacrifice a tooth or two in order that the general result may be improved and the patient equally benefited.—S. H. Guilford, *Items of Interest.*

Ancient Hygiene.—*Health* states that—Even at this late day, with the many statements of recent and wonderful alleged progress made in medicine and surgery, there is nothing really new under the sun. The diseases which beset the human frame in these days afflicted the world 2000 years ago and more, and the learned doctors of that period treated them on the same general principles, if not with such full medical knowledge. The Old Testament is full of commands of great sanitary value, and they were an adaptation of the medical knowledge of Egypt, elaborated and developed. The law provided for personal cleanliness, the isolation of cases of infectious disease, and healthful diet. By prohibiting the use of blood as food, it held that there was a communicability of diseases between cattle and men, as physicians even at this date are upholding against Dr. Koch, of Berlin. The law forbade the eating of quadrupeds which did not divide the hoof and chew the cud, thus bespeaking digestive qualities, enjoined the fighting of infectious disease by fire, forbade the use of food of animals that had died a natural death, of carrion-eating birds, and of fish without scales and fins. The sanitation and hygiene of the

Bible is amplified and developed in the Talmud, which still gives hygienic law to the Jews. How complete is this conception of hygiene, physiology, and medicine in this work of the pre-Christian era can be seen by a few of the diseases diagnosed in the Talmud 2000 years before the present time, when physicians are still struggling with them: Malignant throat trouble (probably diphtheria), jaundice, colic, nervous prostration, hydrophobia, gastritis, nosebleed, hemorrhage of the lungs, congestion of the brain, dropsy, malaria, ophthalmia, convulsions, tonsillitis, cancer, gout, earache, toothache, and headache, and a thousand other ills. In one place the Talmud gives these five symptoms of rabies in a dog: Its mouth is continually open, its saliva flows freely, its ears dangle, its tail is held between its legs, and it walks in by-paths. It is ordered that such a dog be destroyed by means of an arrow or a knife thrown at it. Personal contact with it must be shunned, because injury will be the result of contact, death that of a bite.—*American Medicine.*

Method of Obtaining Chemically Pure Silver.—To obtain chemically pure silver, we dissolve a silver coin in chemically pure, concentrated nitric acid, diluted with its own volume of distilled water. The coin, cut into several fragments, is placed in a flask and the diluted acid added; the solution of the coin is hastened by gently warming the solution in a sand bath. After the coin has dissolved, allow the liquid—now a silver nitrate—to cool, and then add an equal bulk of distilled water. If this liquid is not perfectly clear, filter it. Now make a saturated solution of table salt in distilled water; add some of the salt solution to the silver solution in the flask, when insoluble curdy white silver chlorid will form. Shake the flask and contents for a moment, then allow the silver chlorid to sink, and as the liquid above becomes clear, add to it a few more drops of salt solution, noting whether any further formation of silver chlorid occurs. We must continue to add the salt solution to the silver solution until it fails to occasion the formation of any further precipitate of silver chlorid.

We now pour off (decant) all the liquid, leaving the moist, white precipitate in the flask. Then we partially fill the flask with distilled water, and, stoppering the flask, shake vigorously; then let the precipitate settle, and decant this wash-water. We repeat this washing of the white silver chlorid several times, and then test the wash-water, after pouring it from the flask, with a few drops of ammonia, when, should the slightest blue tint be produced, we must continue the washing of the silver chlorid, each time, of course, employing fresh water. When the wash-water fails to exhibit a blue color on adding ammonia, we know that all copper originally present in the silver coin has been removed.

We now place the silver chlorid in a beaker, add twice its bulk of water and about one-tenth as much pure sulfuric acid, and introduce a few nails—the common lath nails—and stir the mixture with a glass rod until all of the silver chlorid becomes changed to a dark gray powder. This powder is pure silver, and is to be washed several times with dilute hydrochloric acid, then with distilled water; then it is to be dried, mixed with an equal bulk of potassium carbonate, and fused in a boraxed crucible, from which it may be poured into an ingot mold, giving us chemically pure silver.—H. H. Boom, *Stomatologist.*

Treatment of Pyorrhea Alveolaris.—In some particulars my work is different from that of other operators. One difference is that in all inaccessible positions I invariably pack the pocket first. I syringe it out, clean it antiseptically, and pack it in such a way as to lift out temporarily the loose tissue, so that on future occasions I can see the surface that was hidden from me at the beginning. In those bad, inaccessible places I do not rely altogether on the sense of touch to know that the tooth has been cleaned and polished. There are many who criticize this proceeding, claiming that I am forcing away tissue which is already too far away from the tooth, but I maintain that if this can be done without seriously injuring it, getting the tooth surgically clean as well as the pocket, and forcing back the tissue, I have brought healthy tissue down upon a healthy surface, and I usually get good results. I pack it with gauze cut in such shape as to be most convenient for the desired position, and usually, for the last five years, I moisten it in a twenty-five per cent. solution of phéno-sulphonic acid. This is not strong enough to be corrosive, but it is styptic, and will control the bleeding. It also has a softening influence upon the calcific deposits. I have proved to the satisfaction of a great many who have watched it that it will dissolve deposits, and certainly in many cases where it was difficult to even scratch the deposits, so hard were they, before applying this treatment, afterward they could be removed very easily. Then if the case be one of extensive pocket—and by that I mean enveloping perhaps half the root of a tooth—I may keep it packed, and make it heal

from the bottom as a surgical wound. Of course if the peridental membrane has entirely lost its attachment it will never be re-established, and the best we can obtain is a mechanical union. So I sometimes in these very severe cases keep the pocket packed until it heals from the bottom—in other words, not to allow the gum to draw tight at its margin, leaving a large cavity above which is going to be filled with infective material seeping in and retained there because of the hugging of the gum at its margin. I sometimes find it necessary to make an opening through the gum high up rather than to stretch it at its margin, and clean the place through that.

I always insist on the patient's general systemic condition being looked after, and the important things that must be kept in mind relate to perfect elimination. This oftentimes can be accomplished by simply requiring the patient to drink some good wholesome water, say eight glasses in the twenty-four hours, in addition to what is taken at meal times. I usually require such patients to eat large quantities of fresh fruits. Many times I find that is all the systemic treatment that is needed, in addition, of course, to the proper diet. Many times I have to resort to the salicylates, and sometimes iodid of potassium and some other agents, which would naturally suggest themselves for particular cases.—Elgin MaWhinney, *Dental Review.*

Forty-nine Cases of Artificial Dentures Swallowed.—It is rather wonderful to notice nature's tolerance in some cases, and the apparent lack of sensation manifested by several patients who swallowed plates and retained them in the esophagus for a considerable time, several months in two cases, without the slightest suspicion that there was any particular trouble—only a sore throat. It is rather wonderful, too, that some of these plates, carrying from six to ten teeth, could have been swallowed at all, and when we notice that plates carrying five, six, and even seven teeth have passed entirely through the digestive tract without any injurious effects or much discomfort, it helps us to realize that we are really wonderfully made. It is also interesting to note that six cases were operated upon—three esophagotomies, two laryngotomies, and one tracheotomy, and all recovered. Several of these operations were performed nearly fifty years ago. Of a series of forty-nine plates swallowed, thirty-four were of metal, eight of vulcanite, and seven of material not mentioned. (These statistics were obtained from a complete file of the Dental Cosmos.)

The number of teeth on the various plates was as follows: One without any, five had one each, ten had two each, four had three each, six had four each, five had five each, three had six each, two had seven each, one had eight, one had nine, one had ten, and in ten the number of teeth was not mentioned. Many of them had clasps, which were probably the most dangerous parts, and were doubtless the cause of several of the deaths. I think it likely that most of these plates were of the "horse-shoe" variety, carrying one or more of the upper front teeth. This style of plate was a very common one, the custom among dentists for many years being to make either a full denture or a "horse-shoe" carrying "a set of four," or a "set of six" front teeth. This might account for the cases in which the plates remained in the esophagus so long without discomfort, the palatal portion of the plate fitting closely to the wall of the esophagus, and not offering much obstruction to the passage of food. The conditions under which the plates were swallowed were the following: Seventeen during sleep, ten during fits, mostly epileptic, one during puerpural convulsions, seven while eating or drinking, one during a fall, thirteen conditions not mentioned. Of the forty-nine plates, nine lodged in the pharynx, twenty-seven in the esophagus, two in the trachea, and one in the stomach. Nine passed through the entire digestive tract without giving the patients any trouble, although several of these must have lodged somewhere in the stomach or intestines, as shown by the time occupied in passing through. One was not found, although the patient died and a post-mortem was held. Three of those lodging in the esophagus were pushed through into the stomach and passed on without difficulty, making a total of twelve that passed through the bowels. Of these three had two teeth, one had three, one had four, two had five, two had six, one had seven, and in two the number of teeth was not mentioned. One of the most interesting tabulations is that of the number of days occupied in the passage of these plates. One was two days, two were three days, one was five days, two were seven days, one was nine days, one was twelve days, one was one hundred and eleven days, and in three, time not mentioned. It is rather remarkable that the plate which was in the body one hundred and eleven days did not cause any serious trouble. We would think that there would have been an erosion of the tissues where it was lodged, or that it would have caused an obstruction. Of the nine plates lodged in the pharynx, one caused

immediate death by lodging above the epiglottis and closing it. Another remained in the pharynx four and one-half months and was removed post-mortem, the patient dying of bronchitis. Five were removed through the mouth, by the finger or forceps, after remaining in the pharynx varying periods of from a few hours to five months. The plate that remained in for five months was a rubber piece carrying five teeth, swallowed during sleep. The patient had complained of sore throat, but never suspected having swallowed the plate. The other two were removed by pharyngotomy and recovered. A peculiar result of one of these operations was the changing of the patient's voice from tenor to bass, supposedly on account of the vocal cords being thickened afterward.

Of the twenty-seven plates of the series that became lodged in the esophagus, two caused ulceration of the aorta and death, one was pushed down the esophagus nearly to the stomach and remained there three months, when death intervened. Three were pushed into the stomach and passed through the bowels. One remained in the esophagus nineteen days, was pushed into the stomach, and was vomited ninety-seven days later, making a total of one hundred and sixteen days in the body. Five others were either vomited or coughed up, one of the patients dying eight days later as a result of inflammation. Another remained in the esophagus fifteen months and the patient, who had swallowed it during a fit, never suspected it to be the cause of a sore throat during all these months. This plate was coughed up. Ten of this group were fished out via the mouth, having remained in from a few hours to three and one-half months. Three were removed by operation of esophagotomy, and all three patients recovered.

Of the two in the trachea, one caused death in a short time, the other was removed by operation and the patient recovered. The one mentioned as having lodged in the stomach was fished out with an esophageal coin catcher. One plate carrying two teeth was swallowed, and the patient died a week later. The plate could not be found post-mortem. There were ten fatalities out of the forty-nine cases, as follows: Four caused ulceration through wall of esophagus into aorta, pericardium, or lung. One died of bronchitis, one on account of closure of the glottis, one lodged in the trachea, causing asphyxia, one was found low in the esophagus, post-mortem, death having occurred in three months; one died of inflammation after having vomited the plate, and one died a week after swallowing a plate, but it could not be found post-mortem. Thirty-nine patients recovered; of these cases, twelve plates passed through the entire digestive tract, fifteen were fished out through the mouth, six were vomited or coughed up, and six were removed by operations through the neck.—Arthur D. Black, *Northwestern Dental Journal.*

OBITUARY.

DR. CHARLES EDWARD FRANCIS.

Died, at his residence in Stamford, Conn., July 2, 1905, in the seventy-eighth year of his age, Dr. Charles Edward Francis.

Dr. Francis was born in Hartford, Conn., and there he received his early education in the public schools. In his boyhood he learned the business of a druggist, but his tastes and ambition led him to enter the profession of dentistry. With that purpose in view he went to New York in the early days and entered as a student in the office of the late Dr. Barlow. He applied himself earnestly and assiduously to the acquisition of the training necessary to fit himself for his career as a practitioner, and shortly after his advent into the professional ranks became generally recognized as one of the leading dentists of New York, which position he easily maintained throughout his active career and until his retirement from practice about four years ago.

Dr Francis took an active part in all that related to the progress of his profession. He was a frequent contributor to dental literature, active in dental society and educational work, and in every movement tending to give a forward impulse to dentistry. He was one of the founders of the Odontological Society

of New York and at one time its president. He was also elected to the presidency of the First District Society of New York, an associate member of the Hartford Dental Association, the Central Association of Northern New Jersey, and numerous other dental organizations. His practical interest in dental education found expression in his connection with the New York College of Dentistry as one of its founders.

But few men are privileged to have enjoyed a half century of practice in dentistry so full of activities, so adorned with the rewards of honorable service to their colleagues and their fellow men as mark the career of Dr. Francis. Touching humanity at many points as he did, the contact begot only kindliness, sympathy, and good will. No member of the profession in America was more generally beloved and respected. His attitude was always one of helpfulness and encouragement; his life an example to be emulated. His nearest associates never heard him utter an unkind nor a vulgar word. His high moral worth, his excellence as a practitioner and a man have made a lasting impression upon those who were privileged to feel the influence of his personality. His love of nature —which was a strong characteristic—found large expression during his later years in the seclusion of his beautiful home at Stamford, among his trees, his flowers, and his garden. The affection of his friends was to him a solace and one which found more than one public expression: notably at a dinner given in his honor in March 1902, at the Lotus Club, in New York, by his old student and friend Dr. William Carr, at which many distinguished colleagues from his own and adjacent cities paid their tribute of respect and esteem to the guest of honor.

Dr. Francis is survived by his widow, two daughters and one son. His remains are interred at Cedar Hill Cemetery, Hartford, Conn.

DR. H. FINLEY HELMS.

Died, at his home in Lincoln, Neb., July 31, 1905, of cerebral hemorrhage, H. Finley Helms, D.D.S.

Dr. Helms was born near Aurora, Neb., February 22, 1876. After taking his A.B. degree at the University of Nebraska, he began the study of dentistry at Northwestern University, Chicago, completing his course with the class of '99.

After practicing for a short time at Glidden, Iowa, he removed to Lincoln, Neb., where he became prominent in professional and social circles.

At the time of his death he was president of the Lincoln Odontographic Society.

He was married in December 1902 to Miss Lillian Dobbs, who survives him.

Resolutions Passed by the Lincoln Odontographic Society.

Whereas, In the removal of our friend and fellow-practitioner, Dr. H. Finley Helms, this society has sustained the loss of a beloved member, who by his dignity and counsel added much to the profit and interest of its meetings, and who as its honored president did all in his power to promote the welfare and high professional standing of its members; and

Whereas, In his association with the members of the society he ever displayed a kindness of nature and generosity of heart which will always be remembered with the warmest affection; therefore be it

Resolved, That an expression of our sympathy and condolence be extended to his wife and relatives; and further be it

Resolved, That a copy of these resolutions be given to the local papers and dental journals for publication, and that they be placed upon the records of this society.

W. T. Humphrey,
E. G. Antrim,
F. D. Sherwin,
Committee.

DENTAL LEGISLATION.

NEW DENTAL LAW FOR NEBRASKA.

AN ACT TO REGULATE THE PRACTICE OF DENTISTRY, ETC.

Be it enacted by the Legislature of the State of Nebraska:

SECTION 1. (*Dentistry.*) It shall be unlawful for any person to engage in the practice of dentistry in the state of Nebraska unless such person shall have obtained a license from the State Board of Health, countersigned by its dental secretaries, duly appointed under the provisions of this Act; provided, that this Act shall not affect the right of dentists to practice dentistry who have the right to do so under the laws of this state at the time of the passage of this Act.

SEC. 2. (*Secretaries.*) It shall be the duty of the State Board of Health to see that the provisions of this Act are strictly enforced, to grant the certificates as hereinafter provided and to cause to be prosecuted all violations of this Act. Said State Board of Health shall, within sixty days after the approval of this Act, appoint five secretaries to serve for the terms of one (1), two (2), three (3), four (4), and five (5) years, respectively. Said secretaries shall have been actively and legally engaged in the practice of dentistry in the state of Nebraska for at least five years next preceding the date of their appointment, and shall have received the written indorsement of at least fifty (50) legal practitioners of dentistry in the state of Nebraska, and none of said appointees shall be members of the faculty of any dental college or dental department of any medical college in the state of Nebraska, or shall have any financial interest in any such college or department. Said secretaries shall hold office for a term of five years, excepting the first four (4) appointed as set forth in this section of this Act, or until their successors are duly appointed and qualified. In case a vacancy occurs in the office of dental secretary, the State Board of Health shall fill such vacancy by appointment within thirty days after it occurs, the appointee to serve the unexpired term of the secretary whose place becomes vacant.

SEC. 3. (*Secretaries; reorganization; meetings.*) The said dental secretaries shall have the power and it shall be their duty to assist and advise the State Board of Health in the performance of its duties, as prescribed by this Act. To that end they shall organize by the election of one of their number as President, another as Secretary, and another as Vice-President and Treasurer. They shall meet in regular session at the state capitol building during the months of May and November, at such time as they may designate, and may meet at such other times and places in special session as they may deem advisable, or, upon the call of the President of said dental secretaries, or at the notification of the State Board of Health. A written notice of the time, place, and object of any special meeting shall be mailed by the secretary of said dental secretaries to all the dental secretaries not parties to the call, at least fifteen days before the day of meeting. It shall further be their duty at their regular sessions to examine all applicants for permanent license to practice dentistry according to the provisions of this Act, and thereupon make recommendations to the State Board of Health; to collect and apply all fees as directed by the provisions of this Act; to keep a book showing the names of all persons to whom licenses have been granted by the State Board of Health to practice dentistry, and such other books as may be necessary to plainly show the acts and proceedings of said board of health and its dental secretaries.

SEC. 4. (*Same; compensation.*) Out of the funds coming into the hands of the said dental secretaries as hereinafter provided, each dental secretary may receive as commission, $10.00 for each day actually spent in attending meeting in the discharge of the duties of his office, and five cents per mile for each mile actually traveled to and from a meeting of said secretaries. Said secretaries may, in their discretion, elect one member each year as their representative to the meeting of the National Association of Dental Examiners, and may pay to such representatives out of the funds coming into their hands, as hereinafter provided, a sum sufficient to defray the actual expenses of such representative, for not to exceed six days, including the time of coming and going therefrom. Provided, that said expenses of said dental secretaries, and of such representative shall be paid from the fees collected by said secretaries under the provisions of this Act, and no part thereof, or of the other expenses provided for in this Act, shall ever be a claim upon or paid out of the state

treasury. Provided, further, that on the first day of July of each year all sums of money, as hereinafter provided, in excess of one thousand ($1.000.00) dollars remaining in the hands of said dental secretaries, after all proper claims have been paid, shall be turned over to the State Treasurer and become a part of the general school fund.

SEC. 5. (*Records.*) All books of the said State Board of Health and dental secretaries shall be public records, open to public inspection, at all times, and a certified copy thereof, or any part thereof, shall be receivable as evidence in any court of this state. The original shall be kept in the office of the person appointed as secretary of said dental secretaries, wherever he may reside, and he shall furnish a certified copy thereof, or of any part thereof, to any person making application therefor; provided, that he may require the applicant to pay twenty-five cents for each one hundred words or major fraction thereof so copied, such fee to belong to said secretary as his compensation for such work.

SEC. 6. (*Same; removal.*) The State Board of Health shall have the power to remove from office at any time any dental secretary for continued neglect of duty, incompetency, or unprofessional or dishonorable conduct.

SEC. 7. (*Examination.*) Said dental secretaries shall examine at their regular sessions only all applicants for permanent license who shall furnish satisfactory evidence of having complied with the provisions of this Act relating to qualification for examination, and shall recommend the granting of a license to all persons satisfactorily passing such examination, and upon such recommendation the State Board of Health shall grant a license to practice dentistry in the state of Nebraska under the signatures of said board and countersigned by said dental secretaries. The examination of applicants shall be elementary and practical in character but sufficiently thorough to test the fitness of the candidate to practice dentistry. It shall be written in English, and shall include questions on the following subjects: Anatomy, Physiology, Chemistry, Materia Medica, Therapeutics, Metallurgy, Histology, Pathology, Oral Surgery, Operative and Prosthetic Dentistry, Hygiene, and Dental Jurisprudence. Demonstrations of the applicant's skill in operative and prosthetic dentistry shall also be required. In no case shall any applicant be examined or be given a certificate who is not at least twenty-one years of age.

SEC. 8. (*Same; attendance at dental college examinations.*) It shall be the duty of said dental secretaries to cause at least two of their number to be present at all final examinations for the degree of D.D.S. or D.M.D. in dental colleges, schools, or departments legally conducted in the state of Nebraska. Said colleges shall conduct such final examinations orally, in the English language in the presence of said representatives of said dental secretaries, and also deliver to them the questions and original papers containing the written answers to the same upon all subjects wherein final examinations upon such subject has been taken by said applicant during his first or freshman year, and second or junior year. In the absence of any such papers the applicant shall appear before the dental secretaries as provided in Section 7 of this Act, for examination in the subject or subjects wherein such examination papers are not produced. When such final examinations have been attended, as hereinbefore provided, and practical tests in operative and prosthetic dentistry have been taken to the satisfaction of said secretaries, the dental secretaries may, at their discretion, upon the receipt of the regular fee, consider the conditions provided for in Section 7 of this Act, as fully complied with, and recommend an applicant so examined for a license to be issued as provided in said Section 7.

SEC. 9. (*Additional examination.*) Any member of the board may inquire of any applicant for examination concerning his character, qualifications, or experience, and may take testimony with respect thereto, from any one under oath, which he is hereby empowered to administer.

SEC. 10. (*County registration.*) Every person now licensed to practice dentistry in this state, who has failed to register his license with the clerk of the county wherein his place of business is located, as provided by law, must register the same within sixty days after this Act takes effect, and every person who shall hereafter be licensed to practice dentistry in this state shall, within six months thereafter, register in the office of the clerk of the county where his place of business is located, in a book kept by the clerk for such purpose, and called a register of dentists, his name, age, office address, the date and number of license to practice dentistry, and the date of such registration, which registration he shall be entitled to make only upon showing to the county clerk his license and making an affidavit stating his name, age, birthplace, the number of his license and the date of issue; that he is the identical person named in the license; that before receiving the same he complied with all the preliminary requirements of this statute and the rules of the State Board of Health, as to the terms and amount of study and examination; that no money other than the fees prescribed by this statute and said rules was paid directly or indirectly for the license, and that no fraud, misrepresentation or mistake in a material regard was employed or occurred in order that such license should be conferred. The county clerk shall preserve such affidavit in a bound volume and shall issue to every licentiate duly registering and

making such affidavit, a certificate of registration in his county, which shall include a transcript of the registration. Such transcript and license may be offered as primary evidence in all courts of the facts therein stated. A copy of such certificate or registration shall be sent by the county clerk to the secretary of the dental secretaries within five days after it is made. The county clerk's fee for taking such registration and affidavit and issuing such certificate of registration shall be one ($1.00) dollar. A practicing dentist having received lawful authority to practice dentistry in one county of the state, and removing such practice, or part thereof, to another county, shall show, or send by registered mail, to the clerk of such other county his certificate of registration. If such certificate clearly shows that the original registration was of authority issued by the State Board of Health, or if the certificate of registration itself is indorsed by the secretary of the Board of Health as entitled to registration the clerk shall thereupon register the applicant in the register of dentists of the latter county on receipt of a fee of one ($1.00) dollar, and shall stamp or indorse on such certificate or registration the date and his name, preceded by the words "registered also in ———— County," and return the certificate of registration to the applicant. Any lawfully registered person who shall thereafter change his, or her, name according to law shall register the new name with a marginal note of the former name with the clerk of the county or counties where he is practicing, and the clerk shall note upon the margin of his or her former registration in ink the fact of such change, and a cross reference to the new registration. The clerk shall forthwith notify the board of such change. Any county clerk who shall make or knowingly allow to be made upon the register of dentists kept in his office any entry other than provided for in this Act, shall be liable to a penalty of fifty ($50.00) dollars. Any failure, neglect, or refusal on the part of any person holding such license to register the same with the clerk of said county as above directed for a period of six (6) months after the issuance thereof shall ipso facto work a forfeiture of his license; and it shall not be restored except upon payment to the said dental secretaries of the sum of twenty-five ($25.00) dollars. Any suspension, revocation, or reinstalment shall be with the date thereof forthwith noted by the county clerk on the margin of the registration thereof upon the receipt of notice from the secretary of the dental secretaries.

Sec. 11. (*Temporary certificate to practice.*) When the dental secretaries are not in a regular semi-annual session, any one of said dental secretaries may examine any applicant and on his recommendation the board may furnish him a temporary permit to practice dentistry until the next regular meeting of said dental secretaries, when he shall report the fact, at which time the temporary permit shall expire. Such temporary permit shall not be recommended by a member of the dental secretaries after the dental secretaries have rejected the applicant, or if he has received a previously issued temporary permit, or if he has been refused permanent license by the State Board of Health. The member of the dental secretaries conducting such examination may, in advance, charge and receive for his services a fee of five ($5.00) dollars to be applied to his own use as a compensation. No other fee shall be charged for granting such temporary permit.

Sec. 12. (*Qualifications.*) No person shall be eligible for examination for permanent license by said dental secretaries who shall not furnish satisfactory evidence of having graduated from a reputable dental college, the term "reputable" to be understood as defined by Section 13 of this Act, which college shall have been indorsed and adjudged reputable by the State Board of Health, or who shall not have graduated from a high school or similar institution of learning in this or some other state of the United States requiring a four-year course of study, and furnished to the dental secretaries an affidavit containing his or her name, the name of his or her preceptor, and the names of at least two reputable witnesses, sworn to before a notary public in the state of Nebraska, showing that he or she has completed an apprenticeship of five years of twelve months each, with a licensed practitioner of dentistry in the state of Nebraska, or who shall not furnish to said dental secretaries a certificate from the State Board of Dental Examiners, or similar body, of some other state of the United States, showing that he or she has been a licensed practitioner of dentistry in that state for at least five years just previous.

Sec. 13. (*Dental college defined.*) The term "reputable dental college" shall be defined as follows: A dental college or dental department of any university or college, shall be adjudged reputable by the Nebraska State Board of Health when its dental secretaries, in session, after due examination, report that the institution in question fully meets the requirements of the National Association of Dental Examiners, and that its standards as to entrance, course of instruction, and requirements for graduation are such that they would recommend it for recognition by the other dental colleges in the United States.

Sec. 14. (*Apprentices.*) From and after the taking effect of this act any and all persons desiring to enter upon the practice of dentistry in the state of Nebraska without graduating from a reputable college in the United States or producing satisfactory evidence of having been a licensed practitioner in some other state for at least five (5) years, must file with the dental secretaries an affi-

davit sworn to before a notary public of the state of Nebraska of his intention to begin an apprenticeship with a licensed practitioner of this state, and the said affidavit must show that the affiant has regularly graduated from a high school or similar place of learning in the United States, as provided in Section 12 of this Act, and contain, in full, the names of both affiant and proposed preceptor and the names of two reputable witnesses, together with the date of the beginning of his proposed apprenticeship; and the dental secretaries shall issue to affiant a receipt for the same.

Sec. 15. (*Fees; disposition.*) Every person applying to the State Board of Health for a permanent license to practice dentistry shall pay to the treasurer of said dental secretaries a fee of twenty-five ($25.00) dollars, provided that to graduates of Nebraska dental colleges the fee shall be $10.00, which shall in no case be refunded. Necessary expenses, compensation of the said dental secretaries in attendance on meetings not had for the prosecution of violations of this Act, shall be paid out of the fees and funds provided for in this Act. All moneys received under Section 15 shall constitute a fund, as hereinbefore provided, and may be expended only on the joint order of the president and secretary of said dental secretaries. Provided, however, that on the first day of July of each year all sums of money in excess of one thousand ($1,000.00) dollars after the payment of the expense of prosecution of all cases pending for violations of the provisions of this Act, which shall have been collected under the provisions of this section, and shall be in the hands of said dental secretaries, shall be paid to the State Treasurer and become a part of the general school fund.

Sec. 16. (*Practicing dentistry defined.*) Any and all persons shall be understood to be practicing dentistry within the meaning of this Act, who shall for a fee, salary, or reward, paid directly or indirectly, either to himself or to some other person, perform operations of any kind upon, or treat diseases or lesions of the human teeth or jaws, or correct malimposed positions thereof, or display a sign or in any other way advertise himself as a dentist; but nothing in this Act shall prohibit bona fide students of dentistry from operation in the clinical departments of the laboratory of a reputable dental college, or an unlicensed person from performing merely mechanical work on inert matter in a dental office or laboratory; or the student of a licentiate from assisting his preceptor in dental operations while in the presence of and under the personal supervision of his instructor; or a duly licensed physician from treating diseases of the mouth, or performing operations in oral surgery. But nothing in the provisions of this Act shall be construed to permit the performance of dental operations by any unlicensed person under cover of the name of a regular practitioner of dentistry.

Sec. 17. (*Fraudulent diploma, statements, and practice.*) Any person, or company, or association shall be guilty of a misdemeanor, and upon conviction thereof shall be punishable with a fine of not less than fifty ($50.00) dollars, or more than five hundred ($500) dollars, or by imprisonment for not less than five (5) days nor more than ninety days in the county jail, or both by fine and imprisonment, who, (1) shall barter or sell, or offer to barter or sell, any diploma or document, conferring or purporting to confer any dental degree, or any certificate or transcript, made or purporting to be made, pursuant to the laws regulating the license and registration of dentists; or (2) shall purchase or procure by barter, any such diploma, certificate, or transcript, with intent that the same shall be used as evidence of the holder's qualification to practice dentistry, or in fraud of the laws regulating such practice; or (3) shall with fraudulent intent, alter in a material way any such diploma, certificate, or transcript; or (4) shall use or attempt to use any such diploma, certificate, or transcript, which has been purchased, fraudulently issued, counterfeited, or materially altered, either as a license or color of license to practice dentistry, or in order to procure registration as a dentist; or (5) shall practice dentistry under a false or assumed name; or (6) shall assume the degree of "doctor of dental surgery," or "doctor of dental medicine," or shall append the letters "D.D.S." or "D.M.D." to his or her name, the same not having been duly conferred upon him or her by diploma from a recognized dental college or school legally empowered to confer the same, or shall assume any title, or append any letters to his or her name with intent to represent falsely that he or she has received a dental degree or license; or (7) shall in an affidavit require of an applicant for examination, license, or registration, under this Act, wilfully make a false statement in a material regard; or (8) shall engage in the practice of dentistry under any title without causing to be displayed in a conspicuous manner and in a conspicuous place in his or her office the name of each and every person employed in the practice of dentistry therein, together with the word mechanic or apprentice after the name of each unlicensed person employed; or (9) shall within ten days after demand, made by the secretary of the dental secretaries, fail to furnish to said dental secretaries the name and address of all persons practicing or assisting in the practice of dentistry in the office of said person, company, or association, at any time within sixty days prior to said notice, together with a sworn statement showing under and by what license or authority said person, company, or association and said employe are and have been practicing dentistry, but said affidavit shall not be used as

evidence against such person, company, or association in any proceeding under this section; or (10) is practicing dentistry in the state without a license, or after his or her license has been revoked or suspended.

SEC. 18. (*Dental colleges exempt.*) Nothing in the foregoing section shall affect the conferring of degrees and granting of diplomas by reputable dental colleges of this state, nor shall their rights and privileges under the laws of this state be hereby abridged in any manner.

SEC. 19. (*Revocation of license.*) The State Board of Health may revoke or suspend the license of any dentist for any of the following causes:

(1) Conviction of felony, or misdemeanor involving moral turpitude, in which case the record of conviction, or certified copy thereof, certified by the clerk of the court, or the judge in whose court the conviction is had, shall be sufficient evidence.

(2) For unprofessional conduct, gross ignorance, or incompetency in his profession. Unprofessional conduct shall mean the employment of what are known as cappers, or steerers, to obtain business; the obtaining of any fee by fraud or misrepresentation; wilfully betraying professional secrets; employing directly or indirectly any student or suspended or unlicensed dentist to perform operations of any kind, or to treat lesions of the human teeth or jaws, or correct malposed formations thereof, except as provided in Section 16; the advertisement of dental business or treatment or devices in which untruthful, improbable, or impossible statements are made; or habitual intemperance or gross immorality.

SEC. 20. (*Same; proceedings.*) The proceedings to revoke or suspend any license under the first subdivision of Section 19 must be had by the board on the receipt of a certified copy of the record of conviction. All accusations must be in writing, verified by some party familiar with the facts therein charged, and three copies thereof must be filed with the secretary of the said dental secretaries. Upon receiving accusations and upon recommendation of the Board of Dental Secretaries, the State Board of Health, if it deem the charges sufficient, may make an order setting the same for hearing, and requiring the accused to appear and answer at a specified time and place, and the secretary of said dental secretaries shall cause a copy of the order and of the accusation to be served upon the accused at least ten days before the day appointed in the order, to answer the charges and make his defense thereto, unless for sufficient cause the State Board of Health assign another day for that purpose. If he do not appear the board may proceed and determine the accusation in his absence. If the accused plead guilty or refuse to answer the charges, or upon a hearing thereof the board shall find them or any of them to be true it may proceed to a judgment revoking or suspending the license of the accused. The board and the accused may have the benefit of counsel, and the board shall have power to administer oaths, and take the depositions of witnesses in a manner provided by law in civil cases. Upon the revocation of any license the fact shall be noted upon the records of the Board of Health and dental secretaries thereof, and the license shall be marked as cancelled, upon the date of its revocation.

SEC. 21. (*Report.*) The said dental secretaries shall make an annual report of their proceeding to the State Board of Health by the first of December of each year, together with an account of all moneys received and paid out or into the state treasury by them, pursuant to this act.

SEC. 22. (*Quorum.*) Three of said dental secretaries shall constitute a quorum for the transaction of business at any meeting thereof.

SEC. 23. (*Repeal.*) Article 2 of Chapter 55 of the Compiled Statutes of the State of Nebraska, 1903, as heretofore existing, and all acts and parts of acts inconsistent herewith, are hereby repealed.

Approved February 28, 1905.

SOCIETY NOTES AND ANNOUNCEMENTS.

NEW YORK INSTITUTE OF STOMATOLOGY.

OFFER OF PRIZES.

WITH the desire of stimulating investigation in any field of activity directly relating to Dental or Oral Science, the New York Institute of Stomatology offers two prizes for the best papers submitted to it embodying the results of such original research.

The first prize, for the best paper, will be a gold medal and $250; the second prize, for the next best paper, a gold medal and $100.

Conditions: (a) The papers offered for competition must be typewritten in English. (b)

Must contain not less than 1500 nor more than 3500 words. (c) Must be signed by a motto or *nom de plume*. (d) Must be accompanied by a sealed envelope marked with the same motto or *nom de plume* on the outside, containing the true name as well as the motto of the contestant within. (e) Must be sent to the chairman of the Executive Committee, Dr. F. Milton Smith, 38 West 36th street, New York city, on or before March 1, 1906.

Judges: The following gentlemen have consented to act as judges—Dr. C. N. Johnson of Chicago, editor of *Dental Review;* Dr. Eugene H. Smith of Boston, dean of Harvard University Dental School; Dr. Wilbur F. Litch of Philadelphia, editor of *Dental Brief*.

Rules.

1. The papers will be sent to the judges without the sealed envelopes, containing the names of the contestants, which will be retained by the Executive Committee till the decision of the judges is made.

2. In deciding on the merits of papers offered in competition the judges will be requested to take into consideration the value and character of the research work the results of which are presented, more than the literary character of the essays, but to give the latter due credit.

3. The judges are expressly authorized to decide which if any of the papers submitted to them are of sufficient merit to entitle them to the prizes offered, or to withhold the award from all the papers if none are deemed worthy.

4. Authors of the prize papers will be invited to read their essays before a meeting of the Institute, as will the writers of other papers of especial merit, the Institute reserving the right to the first publication of all papers offered in competition.

Papers not used will be promptly returned to the writers. Those read before the Institute will be as fully discussed as possible and when published will be adequately illustrated.

For further information address

Dr. F. Milton Smith,
38 West 36th st., New York, N. Y.

NORTHERN INDIANA DENTAL SOCIETY.

The next annual meeting of the Northern Indiana Dental Society will be held at Logansport, Ind., September 19 and 20, 1905.

Francis M. Bozer, *Sec'y*,
Logansport, Ind.

SOUTHWESTERN IOWA DENTAL ASSOCIATION.

The ninth annual meeting of the Southwestern Iowa Dental Association will be held at Creston, Iowa, October 10 and 11, 1905.

Geo. Brooks, *Sec'y*, Greenfield, Iowa.

NORTHEASTERN DENTAL ASSOCIATION.

The eleventh annual meeting of the Northeastern Dental Association will be held at Rutland, Vermont, October 4, 5, and 6, 1905. Every effort is being made to have a successful meeting; and the co-operation of all ethical members of the profession is desired.

Edgar O. Kinsman, *Sec'y*, Cambridge, Mass.

AMERICAN SOCIETY OF ORTHODONTISTS.

The fourth annual meeting of the American Society of Orthodontists will be held September 28, 29, and 30, 1905, at the Stratford Hotel, cor. Jackson boulevard and Michigan avenue, Chicago, Ill.

Papers will be presented by Dr. Lloyd S. Lourie, Dr. Alfred P. Rogers, Dr. Martin Dewey, Dr. Frederick S. McKay, Dr. Herbert A. Pullen, Dr. R. Ottolengui, Dr. Frederick B. Noyes, Mr. Carl Werntz, Dr. Edward H. Angle, Dr. Varney E. Barnes, Dr. Richard Summa, Dr. Walter H. Ellis, Dr. Frank M. Casto, Dr. S. E. Dodson, Dr. Charles A. Hawley, Dr. A. H. Ketcham, Dr. Norman G. Reoch, Dr. William O. Talbot, and Dr. William J. Brady.

All who are interested in orthodontia are cordially invited to take part in this meeting.

Richard Summa,
Frank M. Casto,
Edward H. Angle,
Board of Censors.

SOUTHERN CALIFORNIA DENTAL ASSOCIATION.

THE Southern California Dental Association will hold its eighth annual session in Los Angeles, Cal., November 6, 7, and 8, 1905.

CHAS. M. BENBROOK, *Sec'y*,
Los Angeles, Cal.

SEVENTH AND EIGHTH DISTRICT (N. Y.) DENTAL SOCIETIES.

A UNION meeting of the Seventh and Eighth District Dental societies of the state of New York will be held at the Osburn House, Rochester, October 31, November 1 and 2, 1905.

Mark these dates off in your appointment book and attend. It will be time well spent. If you have anything of interest communicate with the Business Committee.

C. F. BUNBURY, *Chairman*, Rochester,
J. W. GRAVES, Rochester,
S. ESCHELMAN, Buffalo,
D. H. YOUNG, Attica,
Business Committee.

F. MESSERSCHMITT, Rochester,
G. G. BURNS, Rochester,
Clinic Committee.

DENTAL COMMISSIONERS OF CONNECTICUT.

THE Dental Commissioners of the State of Connecticut hereby give notice that they will meet at Hartford on Wednesday, Thursday, and Friday, November 8, 9, and 10, 1905, to examine applicants for license to practice dentistry, and for the transaction of any other business proper to come before said meeting.

Practical examination in operative and prosthetic dentistry will be held Wednesday, November 8th. The written theoretical examination will be held Thursday and Friday, November 9 and 10.

All applicants should apply to the recorder for proper blanks and rules for conducting the examination. Application blanks must be filled in and sworn to, and with fee, filed with the recorder on or before November 1, 1905.

By direction of the Dental Commissioners,

GILBERT M. GRISWOLD, *Recorder*,
783 Main st., Hartford, Conn.

MINNESOTA BOARD OF DENTAL EXAMINERS.

THE next meeting of the Minnesota State Board of Dental Examiners will be held at Minneapolis, October 3, 4, and 5, 1905, at the Dental Department, State University.

All applications must be in by 12 o'clock noon, October 3d.

Application blanks will be furnished upon request by

F. S. JAMES, *Sec'y*,
Winona, Minn.

RHODE ISLAND BOARD OF REGISTRATION.

THE Rhode Island Board of Registration in Dentistry will hold its next meeting for the examination of candidates at the State-house, Providence, R. I., Tuesday, Wednesday, and Thursday, October 3, 4, and 5, 1905.

Application blanks may be obtained of the secretary, and must be carefully filled in and returned, together with the fee of twenty dollars, not later than September 25th.

W. S. KENYON, *Sec'y*,
301 Westminster st., Providence, R.I.

WISCONSIN STATE DENTAL SOCIETY.

AT the thirty-fifth annual meeting of the Wisconsin State Dental Society, held at Oshkosh, Wis., July 18 to 20, 1905, the following officers were elected: F. G. Van Stratum, Hurley, president; M. L. Christensen, Oshkosh, first vice-president; Mary G. Hastings, Oshkosh, second vice-president; W. H. Mueller, Madison, secretary; Adolph Gropper, Milwaukee, treasurer.

The next meeting will be held at Madison, Wis., 1906.

W. H. MUELLER, *Sec'y*.
Madison, Wis.

ARMY DENTAL CORPS.

CIRCULAR 32 (June 30, 1905, W. D.).—The following decisions have been made and are published to the army for the information and guidance of all concerned:

(1) *Quarters for contract surgeons and dental surgeons.* Quarters for contract surgeons and dental surgeons should be assigned by the post commander, and they should be equal to those of a first lieutenant. Contract surgeons and dental surgeons are not entitled to select quarters, having no rank and not being officers. (Decision Sec'y War, June 6, 1905.)

Circular 33 (July 13, 1905, W. D.).—Dental surgeons will hereafter be carried on the muster rolls, and their enlisted assistants on the muster rolls and returns of the hospital at their permanent stations. The enlisted assistant should at all times be at the disposal of the dental surgeon, whom he should accompany on a change of station, and his descriptive list should be kept in the possession of the post surgeon, to whom should be invoiced the articles of his personal equipment. Reports of change of status of the enlisted assistant of the dental surgeon should be made by the post surgeon. By order of the Secretary of War, ADNA R. CHAFFEE, Lieut.-Gen., Chief of Staff.

Dental Surg. Rex H. Rhoades from duty at the Dental Base Station, No. 1, Manila, to Fort William McKinley for duty. (July 5, Phil. D.)

Leave for one month and seven days, to take effect about August 10, 1905, is granted Contract Dental Surg. Charles J. Long, Fort Snelling. (July 20, D. D.)

Dental Surg. Julien R. Bernheim, having reported his arrival at San Francisco, will proceed to Fort Slocum, N. Y., relieving Dental Surg. Douglas E. Foster. (July 24, W. D.)

Leave for one month and fifteen days, to take effect on or about August 5, 1905, is granted Dental Surg. Franklin F. Wing. (July 26, W. D.)

Leave for one month, to take effect upon completion of the special duty assigned to him at Fort Sam Houston, Texas, is granted Contract Dental Surg. Clarence E. Lauderdale. (August 3, D. T.)

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JULY 1905.

July 4.

No. 793,681, to FRANK RITTER. Head-rest for dental chairs.

No. 793,682, to JOSÉ J. ROJO. Rubber-dam holder.

No. 793,999, to LEO E. EVSLIN. Means for securing artificial teeth to dental plates.

No. 794,006, to GEORGE R. GOSSLING. Dental drill handpiece.

No. 794,007, to GEORGE R. GOSSLING. Handpiece for dental engines.

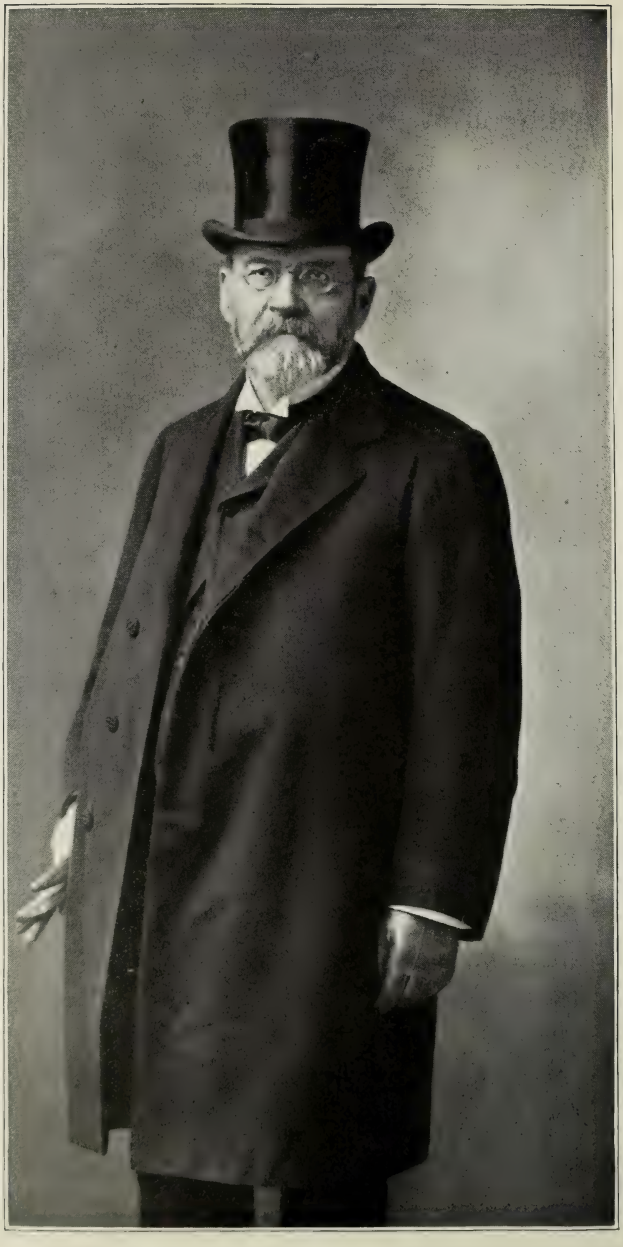
July 18.

No. 795,084, to LOUIS L. WHITE. Artificial upper denture.

July 25.

No. 795,270, to CHARLIE A. DAMON. Dental obtunder.

No. 795,754, to ROBERT E. BARTON. Dentist's tooth clamp.



DR. JOHN LITTLEFIELD.

THE

DENTAL COSMOS.

VOL. XLVII. OCTOBER 1905. No. 10.

ORIGINAL COMMUNICATIONS.

PATHOLOGICAL PROCESSES IN EXTRA-ORAL TEETH.

By W. D. MILLER, M.D., D.D.S., Ph.D., Sc.D., Berlin, Ger.

IT is probably a matter of personal observation to the great majority of practitioners in dental science that pathological processes take place in impacted teeth and in the teeth of dermoid cysts which present a great similarity to caries as it occurs in the mouth. In many cases such processes not having been carefully examined have as a matter of fact been designated as caries and have been made use of against the chemico-parasitic theory of caries, or in support of any theory which at the time appealed to the observer.

I have had the opportunity of examining a number of these cases and of determining how far, if at all, the accounts given of them could be made to harmonize with the conditions actually present.

Professor Peirce, among others, had the kindness to send me a tooth which at the time of its extraction was completely covered by the gum, and in which a cavity was present which showed a great similarity to caries and which had been designated as "caries of a non-erupted tooth." (See DENTAL COSMOS, 1893, vol. xxxv, page 80.)

Peirce not having examined this tooth very strictly, offered no remarks, and in particular drew no far-reaching conclusions from it; but Hans Block (*ibid.*, page 605) says, "This case, where true caries had destroyed an unerupted wisdom tooth, proves that bacteria are not even an essential for caries, as in this instance caries did occur in a tooth which never was exposed to external influences, hence also not to bacteria."

This statement was ventured by Block although neither he nor anyone else had examined the tooth to see whether bacteria were actually absent or not. A careful examination of this tooth, which was reported in full in this journal (1898, page 816), showed both the dentin as well as the enamel cuticle to be permeated by bacteria which in part gave the characteristic iodin reaction and left little room for doubt that at some time or other the tooth had been exposed to the oral fluids. In no case can there be a question of caries without bacteria.

A second case—in which the crown of a lower first bicuspid, which came out on extracting the first temporary molar, presented appearances which might be mistaken for caries—was dealt with also in

this journal (*loc. cit.*). It proved to be only imperfect development and discoloration, the tooth having been bathed for months in the pus of the abscessed temporary molar.

A third case was brought to my notice by the kindness of Dr. Billing of Malmö. It related to an upper canine whose cusp came to view in the hard palate of an otherwise toothless person of sixty years, after swelling and some pain had existed for a considerable time.

The tooth, represented in Fig. 1, had a number of cavities with sharp margins,

Fig. 1.



Resorption in an unerupted tooth.

which being partially filled with dried blood presented the greatest similarity to caries. Thorough examination revealed the fact that the process was purely resorption and that not a trace of caries was present anywhere.

Another case, likewise of an impacted upper canine, very closely resembling the one just described, was presented by Lohmann in *Archiv für Zahnheilkunde.* Lohmann makes no hesitation in pronouncing this case as caries produced by the action of mucin. He had the kindness to send me the tooth, which I carefully examined, to find here also a cavity with perfectly hard smooth walls, and no appearances of any kind which could by any possibility be compared to caries.

In a fifth case for which I am indebted to Zahnarzt Gutmann of Breslau, a defective development of the crown of an impacted third molar, resulting in the formation of an abnormally deep fissure, had led to the supposition that caries might be present. Among all cases of so-called caries in impacted teeth, I have not found a single one in which a careful examination furnished any evidence whatever that a tooth can be subject to caries as long as it is embedded in the tissues of the jaw.

Especial interest attaches in this connection to the observations which have been made on teeth in dermoid cysts. Here, too, we find changes which may be readily misunderstood and which in the absence of a thorough examination are likely to be, and often have been, confused with caries, both dentists and medical men apparently finding it easier to put everything which looks like a hole to the credit of caries than to determine by a careful examination the exact nature of that hole.

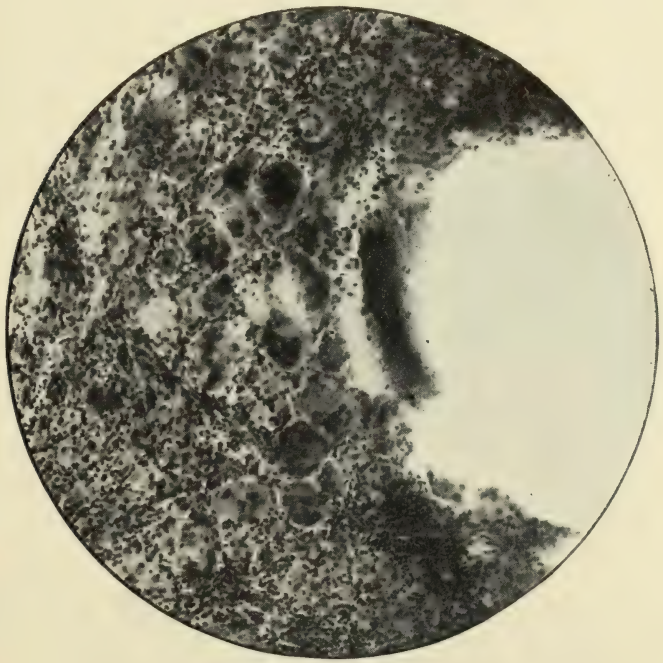
It is needless to say that much harm may be done to the cause of dental science by such lack of care.

At the annual meeting of the Central-Verein Deutscher Zahnärzte in Berlin in 1903, Dr. Trauner of Vienna demonstrated an ovarian cyst containing an upper jaw with a complete set of teeth, many of which had large undermining cavities at the necks which in outward appearance presented so much similarity to caries that a superficial observer might well class them under this category. The subsequent thorough examination of the teeth made by Dr. Trauner (*Oesterreichisch-Ungarische Vierteljahrsschrift für Zahnheilkunde* for October 1904) established the fact that the cavities were produced by absorption alone. At the same meeting the question came up as to whether any case had ever been observed of undoubted caries of the teeth in dermoid cysts, and in the discussion Dr. Schroeder of Greifswald called attention to a cyst at the time in the museum of the Pathological Institute of Greifswald, containing three teeth of which one appeared to be undoubtedly carious.

I immediately applied through Dr. Schroeder to Professor Grawitz for permission to examine the tooth, which was readily granted, and for which I beg to extend my sincere thanks to both of these gentlemen. The tooth in question, which was of the type of an upper third molar, had a large buccal cavity which included the greater part of the crown. The bottom and walls of the cavity were lined with a soft yellowish-brown substance

which as a matter of fact produced the greatest similarity to caries. On a close examination, however, it could be determined that this brown tissue was connected by a narrow band with the wall of the cyst It was also found to be in part movable upon the underlying dentin, which was perfectly hard and could not be penetrated by a pointed instrument.

FIG. 2.



Absorption tissue (from cavity *a* in Fig. 3).

A small portion of this tissue was removed from the cavity and sections were prepared which under the microscope presented the appearance shown in the photograph (Fig. 2).

It is scarcely necessary to state that it is not carious dentin with which we have to do here, but connective tissue with large numbers of small round cells and fewer giant cells; and there is little room for doubt that we have here again a simple case of resorption similar to that presented by Dr. Trauner.

In order to make a more thorough study of the preparation, it was impregnated with Canada balsam, hardened, and sections made, which under the microscope had the appearance shown in Figs 3, 4, and 5.

Fig. 3 presents a longitudinal section of the tooth, showing a distorted root in which the canal has been completely obliterated.

We notice further two large cavities, one (*a*) in the crown, the other (*b*) in the root of the tooth, both partially filled up with connective tissue joined together by a thin band at *c*. In Fig. 4, the cavity *a* is shown somewhat more strongly magnified.

Fig. 5 shows a photograph taken from the margin of the cavity *b* still more highly magnified. At the left is dentin; then comes a layer of newly formed bone or cement, the newest parts appearing dark in the photograph. This is followed by parallel bands of connective tissue showing numerous small round cells, and quite at the right of the figure is epithelium. This preparation, of course, leaves no doubt whatever

Fig. 3.



Longitudinal section of tooth from ovarian cyst. *a*, *b*, *d*, Tissue filling absorption cavities. *c*, Narrow band of connective tissue through which the organ, *a*, received its nourishment. *d*, Absorption of enamel.

Fig. 4.



Cavity *a* of Fig. 3 more highly magnified. *a*, Soft tissue filling cavity. *b*, Dentin. *c*, Enamel.

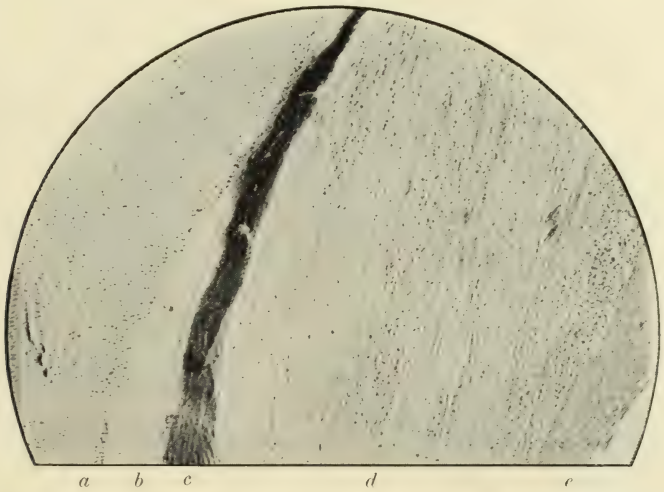
that the whole process is simply one of absorption.

In Fig. 6 we have a photograph of the cavity *d*, from which we see that resorption of the enamel has taken place followed by the deposition of a bony or cement-like substance. This photograph seemed to me to present enough special interest to warrant its reproduction here. It is a well-known fact that absorption of the enamel very often takes place, although this tissue offers more resistance

cavity *a*, had been destroyed either by absorption or strangulation—which might well be the case as the tooth gradually grew more and more out of its socket—the consequent destruction of the soft tissue would have given the cystic liquids free access to the cavities in the tooth, as the result of which a decalcification or softening of the dentin of the walls of these cavities would have been brought about.

There is consequently a possibility that,

Fig. 5.



Tissue from cavity *b* of Fig. 3. *a*, Dentin. *b*, New formation of bone. *c*, Youngest layer of bone. *d*, Bands of connective tissue with numerous round cells. *e*, Epithelium.

than dentin, but I do not recall having seen a case in which a re-deposition of bone had taken place on the surface of enamel undergoing resorption.

The external surface of the enamel gives evidence of having been acted upon by some acid medium, which is of course not to be wondered at, as we know that the contents of ovarian cysts frequently have an acid reaction. There is no trace of softening (decalcification) on the walls of the cavity, these having been protected from the action of the acid by the soft tissue with which they were lined.

If, however, the thin band of tissue at *c* (Fig. 3), through which alone nourishment was conveyed to the tissue filling the

through the combined action of resorption processes and acids, changes may be brought about which macroscopically have the greatest similarity to caries, and which indeed, in the absence of a thorough examination, have repeatedly been put down as presenting that disease.

I come now to the description of a preparation which, more than any other that I have as yet seen, might seem to justify the view that caries may occur in teeth in dermoid cysts. Some four years ago I read in one of our dental journals a reference to an ovarian cyst at that time in the possession of Dr. Callahan of Cincinnati, containing a number of teeth, two having large cavities which everyone

who examined them unhesitatingly pronounced to be caries, so great was the similarity to this disease.

On reading the report I immediately wrote to Dr. Callahan requesting him to permit me to examine the preparation or to send me bits of dentin from the cavities in the teeth. Dr. Callahan could not, however, at that time see his way to granting my wish, as it did not seem ex-

Fig. 6.



Cavity *d* of Fig. 3 more highly magnified. *a*, Enamel. *b*, New formation of bone. *c*, Soft tissue filling cavity. *d*, Decalcified external enamel surface.

pedient to him to allow a preparation of such value to go out of his hands or to disturb its integrity by scraping the cavities for carious dentin. However, at the close of the International Dental Congress, on the Exposition express between St. Louis and Cincinnati, Dr. Callahan most agreeably surprised and delighted me by offering of his own free will to turn the preparation over to me to be made use of in any manner which I might see fit. I do not know how far I am indebted to the exceptionally high temperature prevailing at the time for the softening of Dr. Callahan's heart. Making due allowance for the temperature, I still remain exceedingly indebted to Dr. Callahan and take this opportunity of publicly expressing my thanks to him. Very few indeed would have been willing to part with a specimen of such exceptional value.

The egg-shaped cyst is 14 cm. long and 10 cm. broad. It is divided by a membranous partition into a larger and a smaller cavity. Growing out of this partition and attached to it by a broad neck

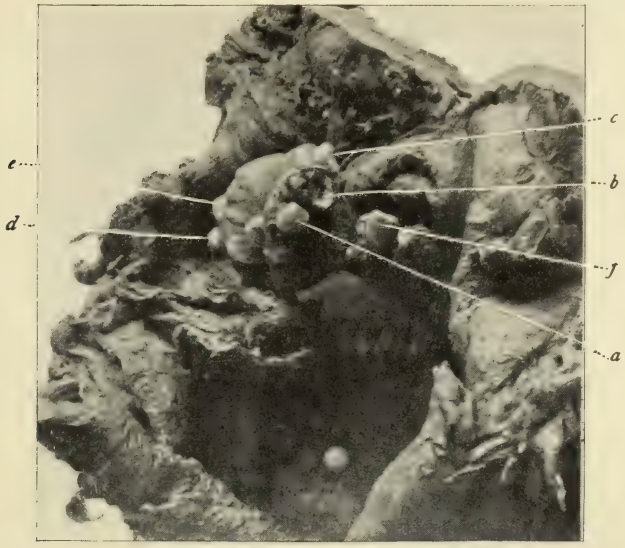
Fig. 7.



Small portion of the wall of an ovarian cyst. Upper jaw with teeth. (Two-thirds natural size.)

is an almost typically shaped upper jaw with a notch at the interior portion corresponding in size and shape to the intermaxillary bone. The jaw itself is 3 cm. long and 3½ cm. broad. On its margins it carries five teeth; on the right side three (Fig. 7, *a, b, c*), closely approaching in shape an upper canine and a second and third molar; on the left side there are two teeth (Fig. 7, *d, e*), the first resembling a somewhat abnormal upper third molar, the second a first molar. Quite outside of the jaw loosely attached to the wall of the cyst, a sixth tooth (*f*), a typical upper canine, is present. Beneath the surface of the cyst hard knots may be felt which are either bone or teeth in the process of development. The whole jaw is supported by thin trabeculæ of bone, and on extracting the

FIG. 8.



Ovarian cyst with upper jaw showing apparently carious molar. (One-half natural size.)

FIG. 9.



Ground section of tooth *b* in Fig. 7. *a*, *b*, Decalcification of the external enamel surface. *d*, Softened (decalcified) dentin.

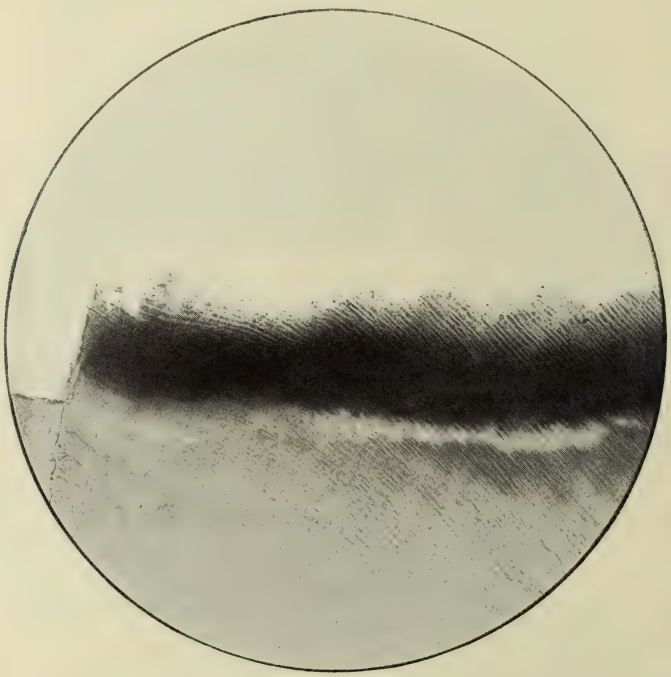
first molar on the right side a parchment-like lamella of bone came along with it, which inclosed the roots of the tooth after the manner of a sheath. The surfaces of all the teeth show more or less extended spots or bands, where the enamel is opaque and chalky as if it had been exposed to the action of an acid.

This appearance is seen in the photograph Fig. 7, particularly at *b* and *d*. These teeth have discolored bands on the palatal surface which correspond in appearance exactly to similar bands seen in the mouth. That which gives the preparation its particular interest is the presence of large cavities in both molars on the right side. In the photograph Fig. 8, the whole grinding-surface of the second molar (tooth *b* of Fig. 7) is seen to be destroyed and the enamel margins chalky and stained. In like manner the buccal surface, and also a large part of the morsal surface, of the third molar have been destroyed, and only the palatal wall as seen in Fig. 8 is left standing. If these teeth had been extracted and handed to the most acute observer he would not have hesitated for a moment to pronounce them to be ordinary cases of true caries of the teeth.

In order to examine the separate teeth and preserve the specimen as far as possible the teeth were removed and longitudinal sections as thin as possible—that is, about $\frac{3}{4}$ mm. thick—sawed out with a fine scroll-saw. The two halves of the teeth were then fixed together again with wax and replaced in the alveoli. The sections themselves were ground down sufficiently thin to be examined with the microscope. In Fig. 9 I have represented a photograph of the section of the tooth, marked *b*. It shows us a considerable decalcification of the enamel cusp at *a*, as well as a slight decalcification of the neck of the tooth at *b*.

It is worthy of note, that zones of transparent dentin are here present in

FIG. 10.

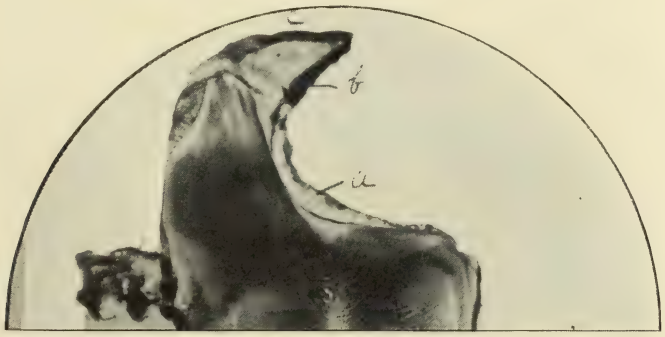


Margin of cavity, showing superficial maceration of the dentin and thickening of the dentinal sheaths.

identically the same form and extent in which we observe them in pathological processes of the teeth in the human mouth. There is, however, no cause for surprise in this fact, since the teeth in dermoid cysts have living pulps and are nourished in the same way as teeth in the mouth, and transparent dentin is nothing more than an expression of vital reaction to external insults whether of mechanical or chemical nature. In the cavity itself we find at *c* a microscopically thin layer, and at *d* a somewhat thicker layer of decalcified dentin. A microscopic examination of this layer revealed Small bits of this substance subjected to the action of chloroform dissolved for the most part, leaving a residue of variously shaped crystals resembling tyrosin, uric acid, glycocholic acid, cholesterin, etc. This waxy substance, the product of the sebaceous glands found in the walls of dermoid cysts, in the deeper layers, had about the consistence of hard paraffin, and after removing most of it I was able to obtain a section of the tooth and grind it down on the stone, keeping the remaining wax *in situ*. (Fig. 11.)

This section revealed the presence of a decalcifying action on the external sur-

FIG. 11.



Longitudinal section of tooth *c* in Fig. 7. *a*, Layer of waxy substance lining the cavity. *b*, Decalcification of the inner enamel surface where not protected by the layer *a*. *c*, Decalcification of external surface.

the total absence of bacteria, as also of the histological changes characteristic of carious dentin. (Fig. 10.)

We notice, however, in Fig. 10 that the surface of the dentin appears to be undergoing a slow process of dissolution or perhaps, more properly speaking, maceration. The appearance is very much the same as that which I have observed in sections of decalcified dentin which have been exposed for months to the action of fermented mixtures of foodstuffs with saliva in which the bacteria had died out.

We notice also an apparent swelling of the tubules in the superficial layers. The cavity of the second tooth (*c* in Figs. 7 and 8) was partially filled with a waxy substance of the consistence of paraffin which showed a slight acid reaction.

face of the enamel (Fig. 11, *c*), likewise on the internal surface (*b*), as far as it was not protected by the waxy substance referred to. Softened or decalcified dentin was nowhere present, and on putting the section into chloroform, the waxy layer was dissolved away, leaving a perfectly hard margin of dentin. (Fig. 12.) On carefully treating a section with chloroform, I found it possible to preserve the crystalline constituents of the waxy body in connection with the section. (Fig. 13.)

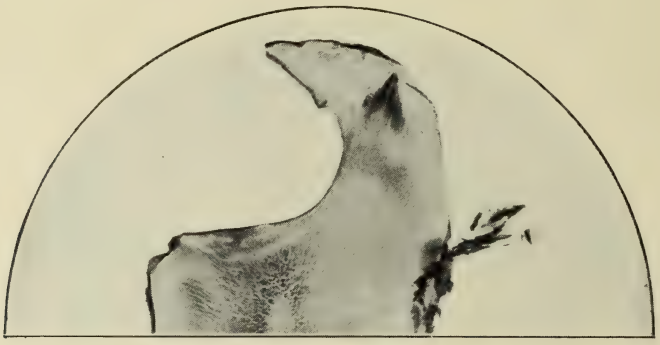
In Fig. 14 I have reproduced a photograph of the margin of the cavity represented in Fig. 11, in which we see changes of the nature of resorption.

In the attempt to account for the appearances above described let me first call

attention to the fact that the contents of ovarian cysts have been found to contain fatty acids, also oxalic acid, large quantities of tyrosin and leucin, and further, cholesterin, etc. I have also evidence of the fact that the contents of the cyst under consideration must have had an acid reaction. On extracting the first molar on the left side, I observed that by exerting pressure upon the walls of the preparation, about two or three drops of a yellow, fatty, thick liquid were pressed into the empty alveolus. This substance had a distinctly acid reaction.

The presence of changes in the teeth of the nature of decalcification may there-

Fig. 12.



Section of same tooth as in Fig. 11, after treating with chloroform.

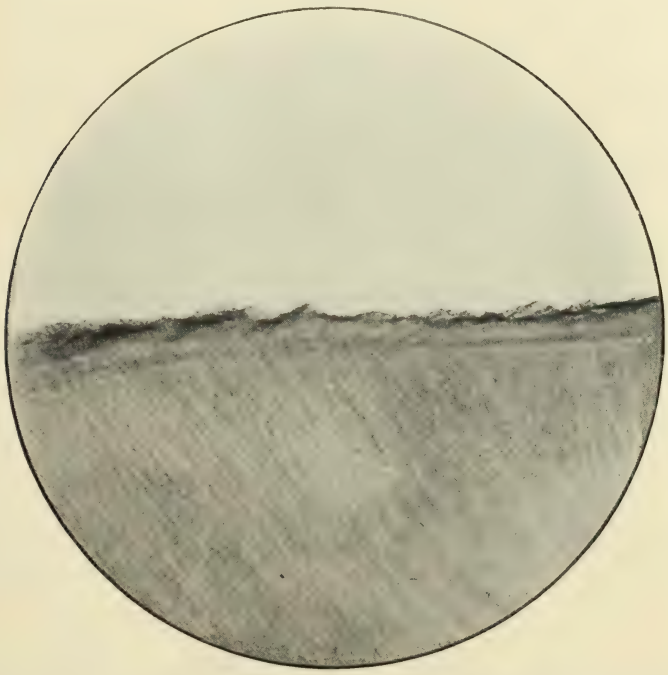
Fig. 13.



Margin of cavity after partial treatment with chloroform; showing crystalline constituents of waxy layer.

fore be readily accounted for; but how are we to account for the formation of the cavities? We have undoubtedly here to do with the combined action of absorption and decalcification. We have already seen that extensive absorption processes have repeatedly been observed in the teeth of dermoid cysts, also that in the cyst under consideration tooth *c* shows signs of absorption as revealed in Fig. 14, and we shall also see that the root of tooth *d* has been completely destroyed by this process. (See Fig. 15.)

FIG. 14.



Section from about the point *c* in Fig. 9; showing process of absorption.

It is reasonably supposed and as a matter of fact we are forced to the conclusion, that just as in the tooth represented in Fig. 3, so here, at some previous time extensive absorption must have taken place, probably before the teeth were fully erupted. Later on, as the teeth were gradually forced out of their sockets, the connection of the absorbing tissue with the wall of the cyst was cut off (compare the process represented in Fig. 3). From this time on, the acid contents of the cyst acting upon the exposed dentin brought about a superficial decalcification as we have seen it in tooth *b*, Fig. 9, whereas the cavity in tooth *c* became filled with the waxy substance (see Fig. 11), which protected the dentin against the action of the acid. In this cavity we accordingly still have traces of the absorption process.

The results of the examination of tooth *d* were equally interesting. On the buccal side of the tooth the enamel, especially toward the neck, was chalky and stained dark brown. The dentin at the neck of the tooth was likewise discolored and softened to the depth of ½ mm. The appearances presented were exactly those of caries at the neck of the tooth in its earlier stages where no loss of substance has yet occurred.

In view of extracting the tooth, I grasped it with the forceps, to find that it came away without the slightest exertion of force. The root had been completely absorbed. A longitudinal section

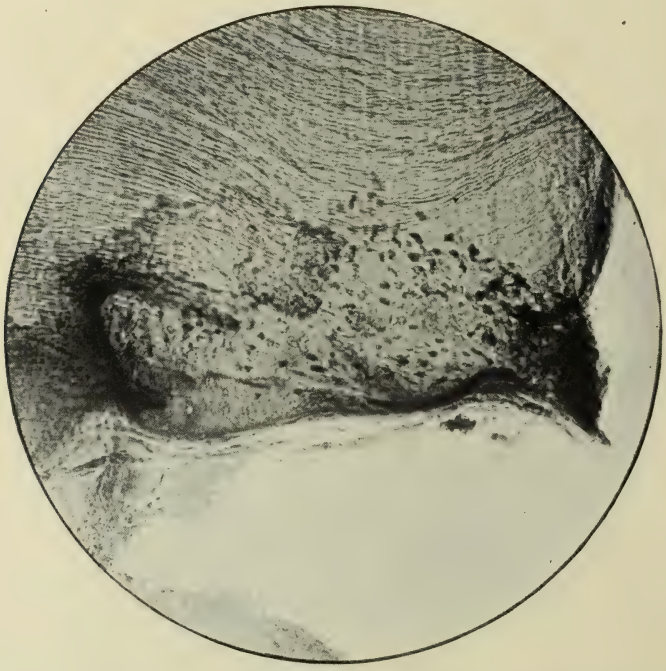
was prepared, photographs of which are reproduced in Figs. 15, 16, and 17.

Fig. 15 shows the process of resorption by which the roots of the tooth were destroyed.

In Fig. 16 a number of interesting changes were brought to light, some of which are to be ascribed to vital processes, while others are of a purely chemical nature. In the first place we notice the presence of a pulp of normal size, but abnormal form inasmuch as the section reveals three horns corresponding to the three cusps of the tooth. Surrounding these horns we see a formation of secondary dentin. We see, furthermore, that the whole external enamel surface has undergone disintegration (decalcification), and that the decalcification at *a* has reached and attacked the dentin. At this point the typical cone of opaque dentin with the bordering transparent bands has been formed.

Fig. 17 shows decalcification at the neck of the tooth without loss of substance. There is in all these appearances nothing surprising and nothing which cannot be readily accounted for. The decalcification is naturally brought about by the acid contents of the cyst. It represents the first stage of caries. The other changes referred to are an expression of the vital reaction of the tooth. The second stage of caries, the impermeation of the dentin by bacteria and the consequent destruction of tissue, is entirely wanting. Were an infection of a chronic nature to take place in an ovarian cyst, and in particular an infection by bacteria possessing a peptonizing power, then we would have all the conditions for the production of typical caries. Otherwise we can have only the first stage, decalcification, combined with such destruction of tissue as is brought about by the process of absorption so common in the teeth of ovarian cysts. Under all circumstances a great difference would still subsist between such caries in ovarian cysts and caries in the mouth, inasmuch

Fig. 15.



From tooth *d* in Fig. 7; showing the destruction of the root by absorption.

as in the first case the acids are secreted by the cyst, whereas in the mouth they are the result of fermentation.

pathological in nature, observed in teeth in dermoid cysts:

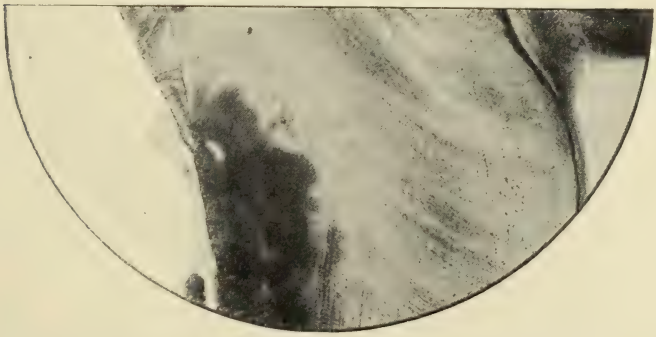
(1) The large cavities frequently

Fig. 16.



Longitudinal section of tooth *d* in Fig. 7; showing pulp, secondary dentin, decalcification of the enamel, and cone of opaque and transparent dentin at *a*, where the decalcification has reached the dentin.

Fig. 17.



Point *b* in Fig. 16 more highly magnified; showing decalcification at neck of tooth without loss of substance.

We may say accordingly that various agencies are concerned in the production of the different processes more or less

found are produced by absorption, probably sometimes beginning before the tooth is completely erupted.

(2) The decalcification is readily accounted for by the presence of acid substances in the contents of the cysts.

(3) No difficulty is presented in explaining the increased transparency of the dentin and the formation of secondary dentin as a manifestation of vital activity on the part of the pulp and its processes.

(4) We must take the possibility into consideration that among the many ingredients of the contents of a dermoid cyst, some one may have a slight dissolving power on decalcified dentin—an inference which is suggested by the maceration referred to above and which is seen in Fig. 10. In this case we must admit the further possibility that an absorption cavity may be deepened or a new cavity formed by the combined action of acid and such macerating substance.

PORCELAIN PROBLEMS.

By JOHN EGBERT NYMAN, D.D.S., Chicago, Ill.

(Read before the New York Odontological Society, at its anniversary meeting, January 1905.)

IN order to apply to the welfare of man the results of discovery of matter or method, the problems that invariably accompany discovery must be solved; only when we have done so do we secure the full benefits of that which the evolution of science develops for us.

Though the solution of present problems but discloses new ones to perplex us, it is inherent in us to persevere. So do we progress toward that which is the destiny of the race and so do we draw nearer that goal which is the ultimate desire.

As with every new method, we do not appreciate the relative importance of the problems it presents until experience has plainly demonstrated it, and we are too prone to ponder over and discuss the detail problems, unwittingly neglecting the more important fundamental ones until we make the uncomfortable discovery that they are the ones we should have studied first—so has it been with "procedures with porcelain." The discovery of new applications for it developed porcelain problems for us to wrestle with. Of late a conviction has come to us that we have been concentrating thought, argument, and experiment upon the less important problems, such as that of "High- or low-fusing porcelain," and that of "Gold or platinum matrices," neglecting the more important ones such as "The relative value of porcelain as a filling," "The field for porcelain inlays," "Cavity preparation with special regard to retention and marginal strength," "Method of constructing the inlay with special reference to fusing," "Color problem with special reference to shadow effect," "The setting of the inlay."

All of these I desire to discuss with you —the less important detail problems as well as the more important fundamental ones—for anything that merits designation as a problem, merits attention and discussion.

Only those problems incident to porcelain inlays will be discussed. Please understand that I do not pretend to present to you the ultimate analysis of the problems that perplex us in porcelain practice, but that I attempt to present the solution as far as up to the present we have been able to solve them.

The profession has been misled by the dogmas proclaimed by certain over-enthusiastic devotees to porcelain inlays.

Here are some of the "articles of faith," so to speak, of the "apostles of porcelain inlays," and time was when it was heresy to doubt or deny them:

"The field for porcelain inlays is only limited by the skill of the operator." "If you believe in porcelain inlays at all you must believe in them everywhere." "Porcelain inlays can be placed anywhere that gold can be placed and they are a better preserver of tooth-structure because they are so compatible." "There will never be recurrent caries about a porcelain inlay."

But the test of time has not justified these declarations, and experience has encouraged long and loud protests against them.

Many are apt to hail each new remedial agent or reparative process as a panacea for all the ills that we are heir to, and with a fatuity hard for a conservative and more experienced mind to understand, abandon the old time-tested methods for the new, forgetting that there are a few things that man has discovered that have not continued to be of use to him, and that a few things that have been added to the sum of knowledge have later been subtracted from it as worthless. Because a method promises a little, they expect more. That a thing may be possible is sufficient for them to proceed as if it were certain.

Such fatuity finds utterance in some such proclamations as "Pluggers are a thing of the past," or assurances such as "For those bordering on nervous prostration and those high-strung nervous temperaments for whom it is a physical impossibility to prepare a cavity even for a *cement* filling, to say nothing of gold, you can do permanent work with porcelain," or, "After the cement has completely crystallized a *thin porcelain filling* in the *occlusal surfaces of molars* will have the *full strength of the whole tooth* to resist the masticating stress, and is in *no danger of fracture.*" These quotations are from printed articles.*

Such statements positively discourage instead of tending to encourage the adoption of porcelain inlays by the skilful conservative rank and file of the profession, while they induce others to abandon methods to which they were accustomed and in which they are proficient, for methods involving difficult manipulation of an entirely different character. Misled by assurances, should they perchance attempt this process in a case in which it is really contra-indicated, the result that ensues is apt to shatter their faith in porcelain inlays altogether and make prejudiced antagonists of them.

Enthusiasm is commendable—without it we would degenerate—but when it cuts loose from reason and experience it is to be deprecated, for it is too apt to go astray.

The extremist is a dangerous man, and one who in enthusiasm follows him to the end is apt to find it a bitter one, and (to aptly put it in the vernacular) to either "fall down" or find himself "up against it," and it is depressing to have to retrace and retract, for while doing so one's enthusiasm is so apt to ooze out and leave an aching void behind.

Extravagant claims often result in great discredit, and of that porcelain inlays are in great danger now. Especially is this due to the statement that "their scope is limited only by the ability of the operator." The ability of the operator is a limiting factor in all methods, and therefore need not be considered in the discussion of a special method. "Their scope is limited"—and by factors which are beyond the control of the operator.

If there is one thing more than all others that I would impress upon the profession, it is that porcelain processes have come to take their place with the other processes at our command, and not to eliminate them.

THE VALUE OF PORCELAIN AS A FILLING MATERIAL.

The ideal filling is one which restores a tooth to normal condition and permanently maintains such condition.

One of the first problems that occurs to us is, Will the porcelain inlays preserve a tooth? Are they permanent?—and one of the first questions a patient asks is, "Doctor, will it last?"

Experience indorses an assurance that in their proper field they will preserve a

Dental Review, September 1903.

tooth and are permanent. But, queries someone, "How can you claim them to be permanent fillings when the real filling is cement which we know to be of temporary nature—in some mouths wasting away rapidly?" "A crevice is certain to be formed between the walls of the inlay and the tooth, in which débris of food will accumulate and which affords an ideal habitat for the micro-organism which destroys tooth-structure." "Decay is certain to occur," and so it would seem.

But right here we have an example of how theory and reality may differ. Though a crevice of a depth about equal to the thickness of the cement film does form, decay does not occur. Why? There is no satisfactory answer. In attempting to formulate one we find ourselves involved in a consideration of some of the causes of recurrent decay about gold fillings, which may be equally significant in this analysis, and which suggests that the elimination of these causes in a measure explains that which is not clear to us in regard to the protective qualities of porcelain.

We know—

That the cutting of deep pits or undercuts leaving unsupported arches of enamel is apt to result in fracture of such arches while gold is being packed in the pits or undercuts.

That the placing of a section of tooth-enamel in an abnormal environment, *i.e.* with a non-adherent substratum of metal instead of an adherent substratum of dentin, may result in the slow disintegration of that section.

That the process of malleting may result in an unnoticed chipping of the margins.

That the "flow" of metals under frequent stress may result in fracture of whole sections of tooth-structure.

That the dehydration of tooth-structure incidental to filling with gold, which in the insertion of large fillings is both prolonged and profound, may injure seriously that structure, which injury is seldom evident until some time has elapsed.

We know—

That these injuries are important factors favoring the institution of recurrent caries.

We know—

That the technique of inlay operations and the physical characteristics of porcelain are such as to eliminate these factors.

Consequently, a strong suggestion arises that the elimination of those factors in no small degree contributes to the permanence of inlays and to their value as reparative and protective measures. But even so, we are far from the ultimate analysis. It is one of those inexplicable, apparently illogical facts that we sometimes meet, and of which we have such striking examples in the matter of immunity and susceptibility in general.

Recent experiments with cements* have yielded results that have caused some uneasiness to inlay advocates. But the results were not absolutely conclusive, the experiments not being carried on amid environments identical with those in the mouth; and as such a procedure seems practically impossible, clinical experience is still to be regarded as very important evidence, and such experience warrants a declaration that, in their proper field, inlays are permanent.

This fact of permanence alone is sufficient to class porcelain as a valuable filling material; but when we consider that it has practically no thermal conductivity, that it so closely resembles tooth-structure as to be indistinguishable, that its insertion involves less suffering and exhaustion to the patient, less fatigue to the operator, less loss of tooth-structure in preparation of cavities in its proper field, it must be conceded that it is a most valuable filling material.

This fact established, as it is, by experience, the next problem to be considered is

THE FIELD FOR PORCELAIN INLAYS.

Frequently at dental meetings has the question been asked of some noted inlay advocate, "Doctor, do you ever put in a

* Poundstone, "The Cement Problem in Inlay Work," DENTAL COSMOS, July 1905, page 756.

gold or amalgam filling any more?"—and the noted one shrugs his shoulder and replies "Oh, yes; sometimes." "But where, Doctor?" queries the ordinary practitioner. "Where an inlay is not indicated," replies the noted one in a tone of finality that intimates that the noted one regards this as a closed incident, albeit the ordinary practitioner does not appear to realize that a most luminous explanation has been vouchsafed him.

cavity or of the occlusion or of the configuration of the occlusal surface of the tooth be such as to permit the insertion of an inlay the angles of whose walls with the surface is 90 degrees or more. (See Figs. 1, 2, 3, 4.)

While porcelain has many commendable properties it has some deplorable ones, and chief of these is its friability, which means that it has little "edge strength"—an essential quality in filling materials,

FIG. 1.

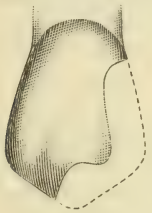
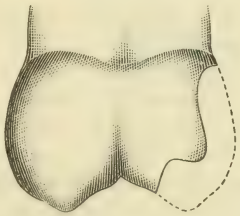


FIG. 2.



FIGS. 1 AND 2: Indicate the point to which the occlusal margin should be carried in a compound cavity in a typical bicuspid and molar with typical occlusion, prepared for a porcelain inlay, in order that the margins of the inlay may be strong and durable.

FIG. 3.

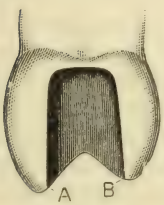
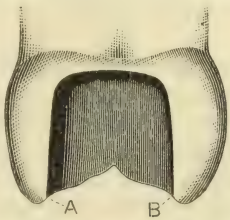


FIG. 4.



FIGS. 3 AND 4: Indicate the weak sections at A and B in a typical bicuspid and molar. It is at these points that "chipping" of the inlay margins is first noticed.

There is the crucial point of these problems of porcelain inlays.

Where are porcelain inlays indicated and where are they not? Is there any sharp dividing line that clearly defines the field for porcelain inlays? Yes—exposure of the margins to the stress of mastication. Except in the anterior teeth, where on account of the conspicuous situation the factor of appearance is paramount to that of permanence, porcelain inlays are contra-indicated if their margins will be exposed to masticatory stress, unless the character of the

on account of the structure and physical properties of dental enamel.

As with any other filling, the permanence of a porcelain inlay depends upon the integrity of its margins.

From these facts, by simple logic we develop a conviction that porcelain should not be placed in cavities in bicuspids and molars (with the exception above noted) which are upon or extend to the occlusal surface, and clinical experience makes this conviction more profound.

It is a fact that there is incident to all inlays some washing out of the cement

film, resulting in a crevice about equal in depth to the width of the film and leaving the inlay margin unsupported to that extent; this unsupported inlay margin chips off under the attrition of the teeth, causing a wider crevice, which results in a deeper crevice, leaving more unsupported porcelain margins which further chip, and so the progressive process of disintegration goes on.

So many men have by careful observation determined these facts that they are not to be questioned. It need not be charged in refutation that those who advise against porcelain in this class of cavities are those who lack the skill to properly prepare and insert porcelain or who are prejudiced against the material; for the writer knows of many men of the highest skill in this art who deprecate its insertion in such places and regret that their own experience forces them to do so.*

The writer is fully appreciative of the value of porcelain in the practice of our profession and for years has persistently used it and advocated it, and yet the years have taught him unmistakably that it has its limitations and that this is one of them.

Many of these compound occlusal cavities in bicuspids and molars are of such a character that the mere removal of carious and infected dentin and the breaking down of frail enamel walls results in a cavity of such decided retentive shape as requires very little further instrumentation for insertion of gold, while preparation for an inlay would mean wedging to an extent not to be thought of, or a cutting away of sound tooth-structure in an unjustifiable manner, with the infliction of much unnecessary pain.

Compound occlusal cavities in bicuspids and molars, fissure cavities, small buccal cavities in molars, and lingual cavities in incisors, of the "pit" variety, are considered as without the field for porcelain inlays. So too are those cases in which two-thirds of the crown has been lost, especially if the pulp has been devitalized.

* Thompson, "An Estimate of Porcelain as a Filling Material," *Dental Review*, September 1904.

The factor of time must be considered. In these small cavities gold can be inserted in about the time it would take to adapt a matrix. Furthermore, the manipulation of small inlays is very difficult, the fusing very uncertain, and the results often disappointing.

The writer believes that if a pulp has been protected against thermal shock, gold is as "compatible," in the accepted meaning of the word, as is porcelain, and that a gold filling properly inserted, with scrupulous regard to cavity preparation, adaptation, condensation, and finish of the material, is as good a protector of the surface in which it is placed as is any porcelain inlay that might be inserted.

The records show too many instances of gold fillings permanently protecting the surfaces they were placed in throughout a long lapse of years, although continuous susceptibility was manifest in the mouth, to justify a belief that there is any specific quality in gold itself that is inimical to tooth-structure.

What, then, is the field for porcelain inlays? Cavities in incisors; buccal cavities in molars and bicuspids; cavities in molars and bicuspids with vital pulps, which include the entire occlusal surface —a field which should be large enough in all conscience to satisfy the most ardent porcelain inlay advocates; and the sooner they recognize its metes and bounds and confine themselves to them the better it will be for them and for their patients.

THE PROBLEM OF CAVITY PREPARATION.

Two great essentials must be borne in mind in considering the problem of cavity preparation—retention and marginal strength.

If the inlay be so situated that it will be exposed to stress, it is not wise to depend on cement alone for retention, expert advice to the contrary notwithstanding. Frequent analogies have been drawn between cement and glue; claims have been made that if the adaptation is absolute, all the air will be forced out and the adhesion will be as strong as if it were a glued joint. It has also been pointed out that a glued joint is strong

because a cabinetmaker is very careful to bring the parts into absolute adaptation under pressure; but, these experts have neglected to also point out that the cabinetmaker glues two pieces of similar wood together and not different woods, except as a veneer, and that when a joint is to be subjected to stress he does not rely upon the glue alone but puts dowels through the joints for additional strength.

The writer recalls very distinctly a case in the hands of a celebrated inlay expert in which cement alone was depended on for retention, which has had to be reset at least five times in the last seven years.

If the inlay will be subjected to stress, cavities should be so shaped that the occlusal pressure will tend to force the inlay more firmly to place. In the upper incisors this would mean greater extension on the lingual surface than on the labial. (See Figs. 5 and 6.) Frequently an approximo-incisal corner of the tooth may safely be left that one would scarcely dare leave if the cavity were to be filled with gold. So shape the cavities that their side lines in the vicinity of the margins are as nearly as possible at right angles with the surface of the tooth. This will result in inlays with strong, thick margins that are not apt to be faultily fused, that are not apt to be fractured in

Fig. 5.

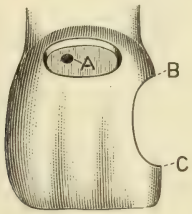
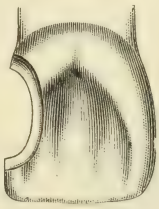


Fig. 6.



Figs. 5 and 6: Illustrate cavity preparation for a typical approximal cavity in an incisor. Fig. 5 at B, C, especially indicates the "wall angle" to obtain strong inlay margins. Fig. 6 shows the greater extension of the cavity on the lingual surface. Fig. 5 also illustrates the preparation of a labial cavity with a pit, A, at one end to act as guide in the final setting of the inlay, should the cavity be one of the nearly symmetrical variety which so often puzzle one as to which end of the inlay is which.

Fig. 7.

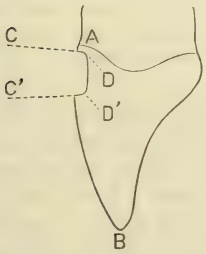
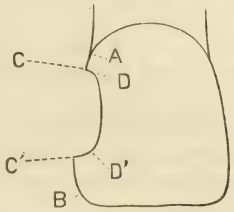


Fig. 8.



Figs. 7 and 8: A–B, the labial line, is a segment of the circumference of a circle of which the lines C D and C′ D′ are radii. It is a geometrical fact that all radii are at right angles to the circumference of a circle at the point of intersection.

Furthermore, in structural characteristics porcelain and tooth-structure are no more alike than are hard wood and iron. Nor is glue akin to cement save in adhesiveness, glue being affected by fluctuations in temperature and by moisture, while cement is not. Practical experience has induced the writer to believe that a cement layer one one-hundredth of an inch thick has greater adhesive power than a layer one one-thousandth in thickness.

setting, and that lessen the shadow effect of the opaque cement. In cavities on convex surfaces this may be done and yet have divergent walls, and most of the surfaces of the incisors are convex. (See Figs. 7 and 8.)

The general floor of the cavity should be as nearly flat as possible; this gives a definite seating to the inlay, so that in setting it may be accurately forced to place without danger of sliding out of position, which would result in the inlay incisal edge. After the matrix has been adapted the teeth must be separated a distance at least equal to the depth of this longitudinal groove and preferably more. (Figs. 9 and 10.) It is just as essential that an inlay should have strong approximal contact at the proper point as it is for any other filling, indeed it is wise to contour the inlay until the contact is stronger than it was before. Then to the adhesiveness of the cement is added the support of the adjacent tooth, a far

Fig. 9.

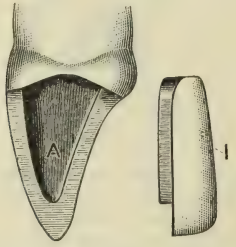


Fig. 10.

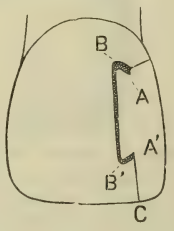


Fig. 9: Showing compound proximo-incisal cavity, from mesial aspect, with wide shallow groove. A, Longitudinal groove. I, Lateral view of inlay; illustrates finished inlay with projecting ridge.

Fig. 10: Shows cross section of the cavity (Fig. 9) with inlay set, indicating the axial wall, A A′ C, so cut that the cavity is deeper at the gingival than at the incisal portion. At B and B′ is shown how the "wide shallow groove" and at A and A′ how the projecting ridge of the inlay have been undercut just prior to the setting of the inlay, to insure the maximum adhesion. These are the only cases in which undercuts are advised.

being found protruded beyond the tooth surface at one point, and depressed beneath it at another, when the surplus cement is removed.

Frail walls of enamel should be cut away to the point where the enamel has the support of the dentin.

The approximo-incisal cavities are the ones that perplex us the most. A decided seat should be cut in the gingival floor, which should be beveled away from the margin. The axial walls should be slanted slightly from the incisal edge to the gingival floor so that the cavity is deeper at the gingival portion than at the incisal. The axial walls should also be slightly beveled toward the lingual aspect, resulting in greater depth of cavity at the lingual than at the labial wall. A groove of slight depth and of as great width as possible is now cut from the gingival floor two-thirds of the distance to the more potent factor in retention than it may theoretically seem to be.

There is another advantage resulting from this form of cavity preparation. Should an inlay loosen, the teeth must be separated to remove it. It is impossible for such an inlay to drop out and be lost —an accident that to the dismay of both patient and dentist has happened to many an inlay which otherwise might easily have been reset.

At all events avoid preparing a cavity so that there will be a thin section of porcelain at any point.

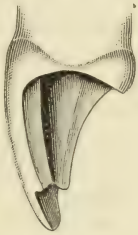
In those incisors whose labial and lingual enamel walls are in contact throughout the incisal third with no septum of dentin, and in those cases where the teeth are spaced and are without approximal contact, an incisal step should be cut involving both labial and lingual walls (with the bevel of floor and wall before

mentioned), with the longitudinal groove in the body of the cavity but not in the wall of the step. Fig. 11 shows the

Fig. 11.



Fig. 12.



labial aspect, and Fig. 12 the mesial aspect. (See also Figs. 13, 14, 15, 16.)

There is neither time nor space in this paper to detail this method of cavity preparation, but such detailed description may be found in papers on the subject by Dr. C. N. Thompson, published in the *Dental Digest,* May 1904, and by the writer, published in the *Dental Summary,* January 1905.

To epitomize this method, it may be said to be a combination of inclined planes and reverse curves so arranged that the resultant inlay must be moved in two directions at once in order to remove it, this compound movement being prevented by the adjacent tooth.

Some critic may deprecate this method because the cavity outline does not harmonize with the contour lines of the teeth. This would be a forcible criticism did the insertion of a porcelain inlay result in a conspicuous line of demarkation, as does the insertion of a gold filling, instead of one which is so inconspicuous as to be indistinguishable under ordinary circumstances.

Complicated and difficult as this method may seem upon a cursory examination, in reality it is most simple. A decade of dental practice has taught me to strive for accuracy and simplicity. The simpler a method is, if it be accurate, the more uniformly successful will be the results.

In preparation of these cavities the usual burs and chisels are used for the removal of carious dentin and weak walls, the deep portions, pits, and undercuts are filled with cement; the final shaping of the walls and margins is accomplished with rubber carborundum disks and "gem" points, while the final finish is imparted with medium cuttlefish disks and Arkansas stone points.

Fig. 13.

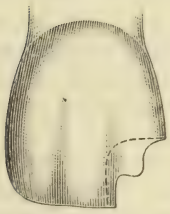


Fig. 14.



Fig. 15.

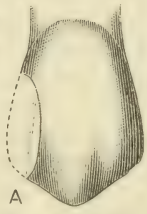


Fig. 16.



Fig. 13: Shows the labial aspect of a cavity preparation for a fractured corner, the dotted line indicating the extension on the lingual surface.

Fig. 14: Shows the mesial aspect of the same. A, Labial wall of cavity. B, Lingual wall of cavity, showing greater extension on the lingual surface.

Fig. 15: Indicates at A the shaping to be given the side wall to obtain strong inlay margins, instead of the shaping indicated by the double-dotted lines, which would result in weak inlay margins.

Fig. 16: Indicates the extension to be practiced when the cavity wall is at the cusp of a typical canine, also showing the gingival step with reverse curve for retention.

THE PROBLEM OF MATRICES.

It seems as if there is a significance in the apt alliteration of "porcelain and platinum"—a suggestion that platinum

is the best material for matrices, irrespective of the intention to use either high- or low-fusing porcelain. To my mind experience indorses this suggestion, and more—it advises platinum instead of gold. The writer knows of a number of men who while they still construct inlays of low-fusing body exclusively, have abandoned gold and now use platinum for matrices except in occasional cases. Notable mention may be made of Dr. Van Woert of Brooklyn and Dr. Cudworth of Milwaukee. The writer has yet to learn, however, of one man who having familiarized himself with the manipulation specific for platinum, has abandoned it for gold.

The greater pliability and adaptability of gold has been emphasized as an argument for gold and matrices. But considering another phase of the proposition these qualities become bases of an antagonistic argument, for this greater pliability means greater danger of warpage in the removal of the matrix from the cavity and during the inevitable and frequent handling that is incident to this work.

A gold matrix necessitates the investing of the matrix, involving an unnecessary waste of time and causing a faulty spot of porcelain should there be a tear in the bottom of the matrix so that the porcelain body comes in contact with the investing material These tears that occur so frequently in the construction of a matrix are usually of no consequence when not occurring at the margins, unless the matrix is imbedded in an investment.

It has been claimed that thinner sheets of gold than of platinum may be used, resulting in a closer fitting inlay. Theoretically this is true, and the fact that this is so would be important were it not for another fact, which I shall mention later, which completely overwhelms this argument.

It has been claimed that matrices of gold may be fitted to cavities to which platinum matrices could not be fitted. Waiving all possible criticism of cavity preparation I flatly assert that a matrix of platinum can be fitted to any cavity to which a gold matrix can be fitted, in practically the same length of time and with practically the same ease of manipution.

Platinum foil as prepared for us today by The S. S. White Dental Mfg. Co. in the thickness of one one-thousandth of an inch (or approximately 25 microns) is such a happy blend of pliability, ductility, and rigidity that it is easily adapted to a cavity, and there is little danger of warpage of matrix in removing it or in the subsequent necessary manipulations if it be handled with merely ordinary care. Its use eliminates all danger of destruction of the matrix through the inadvertent application of excess heat, the necessity of investments with their many disadvantages, and all damaging consequences from the frequent and unavoidable tears in the matrix.

The scope of this article will not permit a detail presentation of the manipulation proper for construction of the matrix, nor is a mere description of the technique effective.*

A clinical demonstration at which the eye assists the ear in conveying to the intelligence and impressing upon the memory the necessary knowledge is the most effective means of imparting the technique of methods to others. The ability to achieve the desired results can only be accomplished by repeated individual effort to follow the methods and advice observed and heard.

Reference will be made to numerous other articles relating to different phases of the subject-matter of this paper, which the writer would advise his associates to

* There are a number of very useful burnishers made by The S. S. White Dental Mfg. Co. that are not depicted or mentioned in the usual advertisements of inlay instruments, viz, No. 33 Flagg's amalgam instruments, and burnishers Nos. 2, 10, 12, 13, The S. S. White Dental Mfg. Co.'s lists. These, with the set of burnishers devised by Dr. W. T. Reeves or those of Dr. C. N. Thompson of Chicago, completely equip one for this work. The little burnisher No. 33 is especially valuable, and was first suggested to the writer by Dr. A. E. Peck of Minneapolis, who also was one of the first to advise cavity preparation that obtains mechanical retention and strong margins of the inlay.

read, but which time will not permit him to quote from to any effective extent.*

As to the advisability of adapting the matrix to the cavity direct by pressure and burnishing, or taking an impression and swaging a matrix upon a model or in the impression, opinion is divided.

There is merit in both methods according to the situation of the cavity in which the inlay is to be inserted, and in some cases the most accurate results are obtained by combining both methods. In many of the buccal and labial cavities, particularly those which extend past the axial lines of the teeth over to the approximal wall, in cavities involving the entire incisal edge, and in that special class of cavities in molars and bicuspids before mentioned, it is better to take an impression and swage the matrix. There are numerous efficient swaging appliances on the market.

In swaging a matrix to a model, the foil should first be approximately adapted to the model, especially to the deeper parts, by pressure and burnishing. Then cover it with a thick piece of spunk, place a mass of moldine upon the spunk, and drive the plunger down upon it. Moldine is the best swaging medium I have found, and the layer of spunk prevents it from sticking to the platinum foil.

The writer would advise the practice of incorporating talcum powder with the cement while plastic, instead of coating the cavity with oil or vaselin to prevent the impression from sticking to the tooth.

Recently a method of taking impressions that is both simple and accurate has been devised.† The low-heat modeling compound manufactured by the Detroit Dental Mfg. Co is used. A matrix is made of a piece of copper plate of about No. 29 gage bent at a right angle—one flap to cover the approximal, the other the occlusal surface. A piece of compound softened in the flame so that it is slightly sticky is placed in the matrix, then the cavity being wet with saliva so that the compound will not adhere to it, the matrix is forced with slight pressure between the teeth over the occlusal surface. At this time only an approximate impression is desired. Chill with cold water from the syringe, remove (this compound is so hard and brittle that it fractures like plaster and may be cut as plaster may be), keeping the compound thoroughly chilled; with a sharp lancet cut away the surplus extending on the surface of the tooth to within a millimeter of the margin; replace it in the cavity; force a wooden wedge between the adjacent tooth and the approximal side of the matrix. Now while making pressure on the occlusal surface of the matrix, have your assistant spray hot water on the tooth and matrix (hot water that can readily be tolerated will soften this compound). You will feel the matrix settle slightly. Immediately you are aware of this, have your assistant spray the matrix with cold water, maintaining the pressure while this is doing. If the cavity has been properly prepared, if it was covered with a film of moisture when the impression was re-inserted, there should be no difficulty in removing it (as the operator has previously cut away the surplus overlapping on the surface of the tooth that might—indeed often does—partially lock the impression and prevent its removal without springing), thus obtaining a remarkably sharp and accurate impression.

A model in either Hewitt's amalgam or Britton's cement may be made, mounted in a die cup; an approximate impression with the low-heat modeling compound taken from the model, if the cavity be a deep one, and the matrix roughly adapted over that; then removed, placed in the cavity and burnished to an approximate fit, then swaged to absolute adaptation (this preliminary adaptation over the impression will prevent any tears along the margins). In many of the

* Allen, "Original Method of Making a Matrix for Inlays," *American Journal of Dental Science*, July 1904, which number of that journal contains a symposium of the various phases of porcelain inlay operations by Cheeseman, Stewart, Schwartz, Hancock, Bridges, Raymond, Patten, Wasser, Phillips, Jameson, and Wheeler—all such able men that the writer strongly advises the reading of their articles. He would also advise the reading of papers by Byram, Custer, and Goslee published in the *Dental Summary*, June 1904.

† Method devised by Dr. Taggart.

complicated cavities in the bicuspids and molars that are considered within the proper field for inlays the situation is such that it is practically impossible to obtain by the direct method as accurate a matrix as may be obtained by the impression method.

In the approximal, compound approximal, and the majority of the labial cavities in the incisors, the matrix can be accurately adapted to the cavity direct by the pressure and burnishing method in approximately the time required to take an impression. Recently the use of gum camphor and cotton tape in construction of the matrix by the direct method has simplified the process. It is essential that the burnishers should be absolutely clean and highly polished or there will be danger of tearing the matrix at some critical point on the margin.

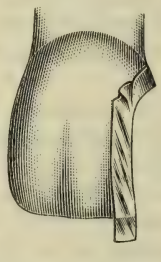
It is difficult to say which of the manifold measures that are a part of porcelain inlay operations is the most critical, but if there be one, it is this of matrix construction, for it is obvious that if this be inaccurate no amount of skill in the subsequent stages can avert a failure.

It must be remembered that the burnishing of platinum in a measure tempers it, and that the heat incident to fusing the porcelain anneals it, and this annealing causes a change of shape or a warpage. Warpage must be guarded against in every possible way, and no process that in any measure obviates it must be overlooked. Therefore after having completed the burnishing of the matrix remove it, anneal it thoroughly, replace it in the cavity, and again adapt it with very gentle pressure exerted only through the medium of cotton pellets and tape, or gum camphor gently packed in, and tape.

In a cavity the gingival margin of which is slightly below the free margin of the gum, the piece of platinum should be given a convex shape approximately corresponding to the convexity of the tooth-surface at the gum margin, by bending it upon a mandrel; the platinum foil can then be readily slipped up between tooth and gum, and the gum will assist in holding it in place during the preliminary fitting. Care must be taken to exert the pressure toward the gingival wall until that wall has been covered, before attempting to force the matrix to the bottom of the cavity, or the flap beneath the gum will be drawn out.

The matrix should be allowed to lap over the margins on the surface of the tooth as far as is possible without making it very difficult of removal without bending; this adds greatly to the rigidity of the matrix, counteracting the tendency to warpage from the shrinkage of the porcelain. In compound cavities, besides allowing it to overlap upon the surface, also allow it to extend beyond the incisal edge 4 or 5 mm. The labial and lingual

Fig. 17.



flaps can be squeezed together, and while strengthening the matrix also make a very convenient point at which to grasp the matrix with the pliers. (Fig. 17.)

HIGH- OR LOW-FUSING PORCELAIN.

The relative merits of high- or low-fusing bodies have been the subject of long discussion.

The writer believes that as there is a certain definite proportion of metals that yields the best results as amalgams, so there is a certain definite proportion of silica, kaolin, feldspar, and flux that yields the best clinical results in shrinkage, retention of shape, and structural strength. This certain proportion fuses at approximately a temperature of 2200° F. Both laboratory and clinical tests have demonstrated that "the higher the fusing the greater the strength" dogma is fallacious.

Experience has demonstrated that, supported by tooth-structure and cement

as an inlay usually is, the difference in structural strength is not an important factor, although it is a decided one in the case of porcelain crown and bridge work.

The great shrinkage and loss of shape in fusion of the low bodies are decidedly objectionable features. Nor do the colors as closely match the shades of the teeth as do the high-fusing bodies. They have, however, the commendable quality of homogeneity which permits of the restoration of glaze by polishing after grinding. Whatever the experience of others, the writer often finds it necessary, despite the exercise of all the skill and ingenuity at his command, to grind an inlay after it has been set.

The higher-fusing bodies have minimum shrinkage, which lessens the necessary number of fusings, and retention of shape and color in their favor, but are apt to develop porosity in fusing and do not take a high polish after being ground. It is evident that each grade of porcelain possesses merits which the other does not in the same degree; and that therefore the use of both grades in conjunction, not in combination (*i.e.* mixed), should give the best results. After a year's trial of this scheme the writer commends it most heartily. It has enabled him to produce better inlays in every particular than he ever could before, and in less time. It has enabled him to control to a greater degree the warpage, and those great bugbears the shadow effect and discoloration due to the opaque cement. This scheme does not mean the complementary use of two grades of porcelain such as Brewster's foundation and Brewster's enamel, but two more widely different grades such as Brewster's foundation and Brewster's gold matrix porcelain, or Whites' inlay and Jenkins' enamel, or *vice versa.*

The writer finds it advantageous to have at his disposal both Whites' and Brewster's high-fusing porcelains, owing to the fact that the shades not being identical, although approximate, they give him a wider selection in matching the multitudinous variation of shades in teeth, relieving him to a large extent of the necessity of mixing shades to get the tint required.

It has been repeatedly declared that a blend of shades must be obtained by fusing a layer of one shade upon a previously fused layer of another instead of mixing them. This is quite unnecessary and adds to the difficulties of manipulation and the number of fusings. While browns should not be mixed with blues (and there is no contingency demanding such a blend), the blues, grays, and greens, or the browns and yellows, may be mixed at will and a perfect blend be more easily obtained. It is in this manner of mixing that the various shades of artificial teeth are obtained.

At the suggestion of Dr. A. E. Peck, The S. S. White Dental Mfg. Co. has manufactured central incisor facings, without pins, of one solid shade (without any yellow at the neck) in sets of six, to correspond with the various shades of their sample shade guide, and Dr. Peck has devised an apparatus by which they may be quickly crushed and powdered.

The writer would suggest that the various manufacturers prepare for us porcelain body firmly ground in shades identical with those of their shade guides, and to insure accuracy that they send with each bottle or box of body a fused sample of that body. Then with one bottle of pure white body for variation, the practitioner would be equipped in the best possible manner. This would very much simplify the selection of shades and improve the color results.

The situation of the cavity has much to do with the shades selected. For labial cavities the shade should be slightly darker than that of the immediate section of the tooth; for mesial cavities slightly lighter, and for distal cavities lighter still.

THE COLOR PROBLEM, INCLUDING THE SHADOW AND DISCOLORATION PROBLEM.

Why is it that many inlays are perfection in color from any angle of vision when set for the moment with saliva, and are quite "another story" when perma-

nently set with cement?—and can this unwelcome change be obviated?

While possibly these effects cannot be eliminated altogether so long as we are obliged to use opaque cement, they still can be reduced to a minimum. The analysis of this problem involves a consideration of "photo-physics" or the phenomena of light. Light coming in contact with matter is refracted, or reflected, or absorbed. Some materials, such as porcelain of certain consistence and ground glass, both reflect and refract at all angles within 90° each way from the line of incidence, and then the light is said to be diffused. The writer suggests that if an inlay be so constructed as to diffuse light, the "shadow" effect may be markedly minimized, and that if the first layer of the inlay be of practically opaque porcelain of nearly white color, the "discoloration" effect may be markedly minimized, for then one has a foundation of definite color which cannot be altered by the subsequent substratum of cement.

The thin layer of opaque foundation porcelain at the bottom may be obtained by adding about 25 per cent. of kaolin to the porcelain body, or the same percentage of powdered zinc oxid. This layer gives a rough under surface to the inlay which increases the adhesion of the cement* (it has been the writer's observation that when an inlay has broken loose without disintegration of the cement, the film of cement has been found adhering to the tooth instead of to the inlay, so that any means of increasing the adhesion of the cement to the inlay should certainly be employed); this opaque layer should be allowed to extend only within one-half mm. of the margins of the matrix. This use of a foundation layer of opaque porcelain was first advocated by Dr. W. H. Taggart of Chicago, one of the most skilful, ingenious, and rational porcelain experts of the profession.

The dentin of a tooth diffuses light at all angles within 90° each way from the "incident line" of light, while the enamel either refracts or reflects according to the angles at which the light strikes its surface. The higher we fuse porcelain the greater becomes the refractive and the less the diffusive power, and if "glaze" materials be mixed in the body, by the time we have fused it to the proper glaze, we have increased the refractive and decreased the diffusive qualities. When porcelain has been highly biscuited (that is with just the suggestion of a glaze) it is at its greatest power of diffusibility.

The writer suggests that we attempt to follow nature more closely by building up the body of an inlay with high-fusing porcelain, biscuited to simulate the dentin, with a final layer of low-fusing porcelain fully fused to simulate the enamel.

When an inlay is set with a transparent medium it is illuminated by the diffused side-light from the dentin as well as the diffused light from the inlay itself. When we reduce the illumination we darken the color. Under ordinary circumstances we do so reduce the illumination when we interpose the opaque film of cement between inlay and tooth, as the film of cement when parallel to the rays of light reflects no light at all. If the inlay be highly fused throughout, the refractive power is increased and the reflective decreased, and the side-light from the dentin being cut off, a "shadow" effect is observed. When the cement film is at right angles to the incident rays of light (as is the case in inlays in labial cavities) then there is greater reflection than from the dentin, as opaque bodies reflect only, while diffusive bodies refract to some extent, and if a cement lighter than the dentin has been used, then the inlay has a lighter color when set.

It has been observed that inlays match the tooth closer after they have been set for several months. This is due to the fact that the wasting away of the cement permits the diffused side-light from the tooth to light the surface stratum of the inlay to a depth equal to the depth of the crevice between tooth and inlay, and this little shimmer of light lessens the shadow effect. (See Fig. 18.) If with a definite color foundation that cannot be changed we select the proper shades and fuse

* The Brewster Dental Co. have now placed on the market a white opaque foundation body that is extremely satisfactory.

them to the point of greatest diffusive power, adding for the final layer a low-fusing body whose thorough fusing does not alter the physical properties of the mass of the inlay already fused, the shadow effect will be almost eliminated. Any local peculiarity such as spots of color, stains, or stained crevices may be very closely reproduced with either Whites' or Brewster's porcelain stains.

It is an unwise thing to drop a finished inlay into the cavity, have the patient run the tongue over it so as to flood it with saliva, and then, handing her a mirror, proudly point to the wonderful thing that you have done. She marvels, compliments you, and settles back in the chair the picture of satisfied delight. But, gentlemen, retribution follows swift on the heels of this deception. I say deception advisedly, for you must admit that you have led her to believe that she has seen the permanent finished result of your skill. Would that it were so; but such is not the case. You know, while she does not, that it will be quite "another story" when that inlay is set with opaque cement. And the disappointment she then evidences is anything but pleasing to your pride. Nor is it wise, even when it is permanently set, to permit her to look at it in a hand-mirror while in the chair, with lips drawn back and teeth exposed in the most direct manner to the light—a position that no one assumes save when in a dental chair. The patient has probably come to you because she has heard "that you put in some new sort of filling" in place of that hideous gold filling that her dear friend Mrs. So-and-so used to display whenever she smiled. She also informs you that she has come to you because she thinks you are "a wonder," for search as she may, and has done, she "cannot see that a thing has ever been done" to that tooth of her dear friend Mrs. So-and-so.

Now that she can very plainly see that you have "done a thing" to her tooth, she feels that you have not done as skilful an operation for her as for her friend—

FIG. 18.

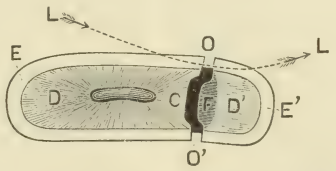


FIG. 18: E, Enamel of the tooth-structure. D, Dentin. C, Line of opaque cement. F, Opaque foundation body of the inlay. D', Highly biscuited body of the inlay. E', Low-fusing enamel of the inlay. O, O', Crevice formed by washing-out of the cement film (much exaggerated in diameter and depth for the sake of clear demonstration). L, L, Ray of light refracted through the enamel of the tooth, across the crevice, lighting up with side light the enamel body of the inlay.

"probably because you were not as much interested in her case as you were in that of her friend," etc.—not realizing that she has examined the inlay in her tooth under conditions that her dear friend would not for a moment place herself in, even to gratify her dearest friend's curiosity, and that if she did, Mrs. So-and-so's inlay would be as evident as her own. You are no longer a wonder to her, you're just a "mere man," and she wonders why she ever said you were a "wonder." She will leave your office a little disappointed, less enthusiastic about you, less confident in you, and like as not a bit reluctant about paying you your fee,

It is the enthusiastic, confident patient that is your "practice-builder."

When you are involved in an inlay operation, banish the hand-mirror from the operating room and be inexorable to any plea for it.

After the inlay has been set, with the surplus cement still about it, and after the patient has left the chair, then let

her have a glimpse of it in the hand-mirror, if she desires—the while engaging her in conversation and explaining to her that the tooth having been dried is now lighter in color than normal, but that the normal color will return in the course of time and that then the tooth and inlay will be a closer match. Also, that porcelain and tooth-structure being of entirely different character, the inlay will always be detectable under close scrutiny, in a direct light; but, that under ordinary circumstances of life, with the light falling on it now from this angle and now from that—with the lips rising and falling like curtains as one speaks or smiles—it cannot be detected nor will its existence ever be suspected. Then your patient leaves, enthusiastic over your skill and confident in you—a missionary in the cause of your material welfare. The psychological effect of exalted first impressions suddenly reduced is something to be avoided. With all due modesty I declare this to be valuable advice to you.

THE CONSTRUCTION OF THE INLAY AND CONTROL OF WARPAGE.

At some surplus point of the matrix, grasp it with a pair of lock pliers, cover the bottom of the inlay to within half a millimeter of the margin with a thin film of the opaque porcelain. Now build up the inlay with high-fusing body of the proper shade to about half a millimeter of the margin of the matrix and nearly to the desired contour; continually jar the matrix by filing the knurled handle of the carving instrument across the shaft of the pliers while building, to bring the moisture to the surface, where it may be absorbed by napkins. Fuse to a high biscuit; replace in cavity and re-adapt the exposed margins of the matrix to the tooth margins; remove; apply the low-fusing body to one-half of the inlay; fuse; apply it to the other half and fuse. Other methods in vogue consist of painting half of the matrix with a thin coat of shellac or sandarac varnish. Allow it to dry, then build on the body out to nearly full contour at all points; fuse—after which there will be found a crevice between the porcelain mass and the matrix which can be filled very readily; this layer of shellac which prevents the porcelain from fusing to the surface of the platinum is burned completely during fusion. This method is advantageous in many cases.* The use of porcelain rods of proper length dropped into the cavity of the matrix, the body being fused about the rod, is also practiced. The cutting of cross grooves in the center of the inlay body before fusing—readjusting to the tooth-cavity afterward and subsequently filling the cross crevices with "body"—is another method.

If there be a tear in the matrix, closely examine the under surface of it before fusing, as often a thinly mixed porcelain under repeated jarrings will run through a slight crevice. It is also essential that there should be no moisture on or about the matrix when the body is applied, or flow of the porcelain paste cannot be controlled.

Be extremely careful not to let the final layer of porcelain overlap the matrix margin; carve the body flush with the surface of the matrix. It is better to have the final enamel surface a line below that of the matrix than to have it overlap in the slightest degree, as the tooth surface can be polished down to that of the inlay after it has been set, very much more easily and successfully than can the surface of the inlay.

The least overlap of porcelain on the surface of the matrix results in a feather edge of porcelain that usually splits off in an uncertain way when the matrix is peeled off, or if it persists until a crevice is formed between the inlay and the tooth, becomes a fine *cheval-de-frise* to catch débris of food or tobacco.

THE PROBLEMS OF FUSING.

Considerable discussion is going on at present as to whether the fusing of porcelain is a physical or a chemical process. It is probable that the fusing we submit

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* Hershey, "A New and Original Method of Making Large Porcelain Restorations," *Items of Interest*, January 1905.

porcelain to is largely a physical process. This is evident from the fact that a piece of porcelain that is properly fused may be ground up, re-fused, and an identical piece of porcelain result. This may be repeated a number of times.

It is certain that in the preliminary preparation of porcelain powders for the market, the first fusing together of the different ingredients is fully as much a chemical as a physical process, resulting in a very stable chemical compound that is not disturbed unless submitted to a much higher heat than is required for proper fusing. The color ingredients are certain definite chemical compounds and the color resulting after fusing does not resemble the original color of any of the color ingredients; and furthermore, after the first fusing none of the original ingredients can be recovered except by some process which involves the destruction of other ingredients. This would not be the case were the primary fusing merely a physical process and were the association of the ingredients merely a mechanical mixture and not a chemical compound. We cannot determine the composition of a mass of porcelain by any method of analysis; it can only be determined by synthetic experimentation. Color as a rule is a chemical characteristic. Chemical analysis by means of the spectroscope is proof of this. With few exceptions, when we alter the chemical composition of a compound we also alter the color of that compound.

It may be that when we pulverize a porcelain mass we mechanically disturb in a slight degree the chemical combinations. The color of the mass before crushing can only be reproduced by submitting it again to just the proper degree of heat. We may at a lower temperature secure a solid mass, but it will not have the same color; nor will it have the same color if we submit it to a much higher temperature, although it, too, results in a solid mass. Much of the color will have "burned out," and "burning" is always a chemical process.

It is a significant fact that repeated heating of a mass of porcelain powder to the point of biscuiting only, results finally in a thoroughly fused glazed piece of porcelain of the proper color.* It is a significant fact that by prolonging the time of exposure to heat, a thoroughly fused, glazed piece of porcelain of characteristic color may be obtained at lower temperature. It is a significant fact that over-fusing results in the vaporizing of certain of the ingredients of the porcelain mass, as is evidenced by the porosity of a piece that has been over-fused (that is, a piece of high-fusing porcelain).

The significance of all this is that heat-units are an important factor in this process. Heat-units are an important factor in processes that are chemical, and not in those that are physical. The logical deduction from these facts, therefore, is that fusion involves both a chemical and a physical process.

It has been demonstrated that by increasing the length of time of exposure to heat, a piece of porcelain can be properly fused at lower heat and that a better piece of porcelain results. The truth of the matter is that many have been broiling their porcelain instead of baking it, and a porous instead of a dense homogeneous mass has been the result.

THE FURNACE; PYROMETRIC DEVICES.

For the low-fusing bodies either gas or electric furnaces may be used. For the high-fusing the electric furnace is best. The fusing of the low-fusing body may be judged accurately by the eye, but the writer does not commend such a practice with the high-fusing bodies. The intense light developed by the high heat required is a shock to the retina. Though there be some who constantly submit their eyes to this strain and as yet have shown no evident impairment of vision, every oculist that I have conversed with on this point has very strongly advised against such a practice. The nature of our call-

* Two masses of porcelain body of identical size and shape were simply biscuited, with no glaze whatever. One piece was submitted to identically the same heat for a number of times, and after the seventh repetition came out one of the most thoroughly fused, beautiful bits of porcelain the writer has ever seen.

ing imposes enough unavoidable severe taxation on our eyes without our submitting them to needless strain. Furthermore, the results obtained by this method are not uniform; especially is this true of high biscuit fusing, which the writer regards as very essential. After years of experience and experimentation, the writer has found that the most convenient and accurate method is that familiarly known as the gold test—that is, running a furnace a certain length of time after a pellet of gold has melted into a globule. The length of time must first be determined by experiment with each new furnace and with each new muffle. After that has been determined, a pellet of the same weight, placed in the same spot in the furnace, must always be used.* It will also be found that large masses of porcelain must be given longer time than smaller ones. Practice enables one to judge quite accurately the variation of time according to the variation of the mass.

That electrical genius, Dr. Weston A. Price, has devised an electric furnace with an electric pyrometer attachment which accurately indicates the heat developed and which yields absolutely uniform, accurate results. The gold test is suggested for those who now have efficient furnaces which they do not care to discard. From sad experience the writer advises the one who is superintending the fusing to do nothing but note the lapse of time after the pellet of gold has melted, or, to his astonishment and dismay, he will find that instead of its taking him about half a minute to do something else, it has taken him a dozen half-minutes and his inlay is ruined.

It is important that the finally fused porcelain mass should be allowed to cool slowly; this imparts a toughness to it that it would not possess if this precaution were not followed. The writer would strongly advise against the final removal of an inlay from a furnace until fully the lapse of a minute after even the glow has disappeared.

* Baldwin, "Possibilities of Baking High-Fusing Porcelain at the Melting-Points of Gold," *Dental Review*, December 1904.

THE SETTING OF THE INLAY.

Oh that we had a transparent cement that were as durable, strong, and adhesive as that opaque material we are obliged to use! With the discovery and perfection of such a medium for setting inlays, many of our perplexing, depressing difficulties will vanish in thin air. Then will dawn the millennium of porcelain inlay builders; then will we count ourselves thrice blessed.

Recent experiments in cements have demonstrated some surprising facts.* It was found that many cements when squeezed to a thin film and allowed to set under pressure have practically no adhesive properties, indeed some of them never properly crystallized at all and speedily disintegrated. It was found that the thinnest film to which cements (as usually mixed for setting inlays) could be squeezed, under pressure greater and more direct than could be exerted in the mouth, ranged from 20 to 30 microns, averaging about 25 microns, and that those thinner than 25 showed little adhesive properties. Twenty-five microns is practically one one-thousandth of an inch.

That disposes of the claim that the use of matrix material of less than one one-thousandth of an inch will result in a cement film that is much thinner; or that by beveling the walls of the cavity so that the walls of the inlay form an angle of about 45° with the general plane of the surface, then the grinding a bit off the bottom of the inlay will enable it to be forced into actual contact with the tooth at the margins, resulting in all the cement being forced out and leaving no opportunity for the formation of any crevice between inlay and tooth. Theoretically this could be done, but practically it cannot, owing to the physical characteristics of cement. Under actual circumstances, this marked beveling of cavity walls simply results in an inlay with frail margins. In making this statement the writer is obliged to confess that principles of cavity preparation that he has previously practiced and advocated

* Poundstone, "A Microscopic Examination of Cements," *Dental Digest*, February 1905.

are—in the light of newly acquired knowledge and in the judgment of wider experience—no longer advisable.

The inlay having been fused for the last time, carefully peel the matrix away from the margins toward the center of the inlay, where the rolled-up mass may readily be grasped and removed in one piece. Holding the inlay between the tips of thumb and finger, go over the bottom of the inlay with a gem point, used dry so that the dust may be blown away; then embed the inlay in wax, exposing the under surface but allowing the wax to extend just a line over the margins. By means of a barbed broach coated with a thin film of wax apply hydrofluoric acid to the inlay, allow it to remain three or four minutes, then wash off thoroughly with water. This surface will be etched; indeed, if examined under a magnifying glass it will be found to be honeycombed to a slight depth. Cement adheres far more tenaciously to such a surface than to one that is smooth. The writer does not believe that as a rule it is either essential or efficacious to cut grooves in the under surface of the inlay, and that such procedure frequently results in a serious accident to the inlay. The end of an orange-wood stick is covered with a small mass of sticky-wax; this is drawn out to a point and the face of an inlay stuck to it. This is the most convenient and safe way of holding the inlay while applying a film of cement to it; and of afterward conveying it to the cavity.

Of all the cements that the writer has tried, Harvard quick-setting and Ames' inlay cement have been most satisfactory. Use the white color for all cavities but the labial. In these use a mixture of equal parts of white and of the brown inlay cement that Dr. Ames has prepared for the setting of gold inlays; these colors seem to insure the best artistic results. Do not use a metal spatula in mixing the cement, as it may discolor it; but use one made of a thick piece of orange-wood trimmed to spatula shape. If the cavity is flooded with carbolic acid to reduce the sensitiveness, as is often done, wash the acid out thoroughly with sterilized water before drying it out with warm air; for to simply remove it with dry cotton pellets and the application of warm air may result in a partial deposit in the cavity of minute unnoticeable crystals of carbolic acid that will impair the adhesion of the cement. The cement having been mixed to the proper consistence, it is applied to the inlay and to the cavity by means of a fine sable brush (No. 0 Winsor & Newton water-color brush) whose bristles have been cut square across, applied with what is known as a "stippling" motion, that is, with the ends of the bristles directly against the surface, that the cement may be forced into all the minute pits, pores, and inequalities. The inlay is then insinuated into the cavity, sliding it back and forth with but slight pressure to squeeze out the surplus cement, gently scraping this surplus away that the relative positions of the margins of tooth and inlay may be ascertained; then with but slightly increased pressure force it to place. Ligate it in position with a silk ligature, doubled twice (but not twisted) so that there will be four parallel strands.

The use of wedges is strongly deprecated. They are usually inserted from the labial aspect; the force of inserting them is exerted in the direction in which the inlay is most readily displaced (*i.e.* in the lingual direction) and ofttimes results in a slightly displaced inlay. After the lapse of about ten minutes the tooth and inlay are coated with a film of plain white vaselin (that is, if Harvard cement has been used—it is not necessary if Ames' inlay cement has been used)—and the patient dismissed, with a subsequent appointment to polish off the surplus cement with cuttlefish disks. If at the subsequent sitting it is found necessary to grind the inlay, do so with small Hindustan stones, afterward polishing with Arkansas stones and fine cuttlefish disks. If you have used low-fusing porcelain for the final layer, as has been suggested, it can be so perfectly polished that one cannot detect that it has been ground.

IN CONCLUSION.

The construction of gold inlays has been so perfected that they now have all

the commendable qualities of porcelain inlays save that of appearance, and for the class of cavities that are held to lie without the field for porcelain inlays, they are strongly advised, if the case be deemed one for inlay restoration.

The problems of porcelain are so numerous and so complex, that a detailed consideration of each one is material sufficient for a monograph, and therefore but a synopsis of each has been attempted.

This paper has been presented not only with intent to impart instruction to, but also to offer suggestions that may lead those who feel the inclination and the ability to do so, to investigate and perchance solve the unsolved problems of porcelain.

The writer cannot bring this paper to conclusion without paying tribute to those pioneers of porcelain inlays, Drs. Reeves, Capon, Head, and Jenkins, who have persistently urged the merits of this art. However we may differ from them in certain phases of the art, we are nevertheless their debtors for the stimulus the profession has received from them, and our esteem is nothing more than their merited reward.

The writer desires to state that the various details of the method of inlay operations he practices have been gleaned from nearly every method that has been advocated. He is debtor to nearly every man who has demonstrated, spoken, or written upon this subject. Now does he realize how wisely did a Roman philosopher, in his old years filled with experience, declare that "There is no doctrine so false that it is utterly devoid of truth."

He would admonish the overzealous missionaries of this new *régime* of dental operations not to forget that "An injury is frequently done to the cause of truth by the manner in which some men attempt to advance it."

He urges, with all the force that there is in him, those who have not done so to familiarize themselves with the technique of these processes which yield such ideal results, that they may keep pace with the profession and that they may meet the demands of a better informed public. Many who have for long turned a deaf ear to the advice of their professional brethren have been forced to study this new work by the insistent demands of their patients. Better be prepared, that such demands may be opportunities, instead of goads, to you.

Sometimes as I contemplate the beauty, utility, and durability inherent in the human teeth, I almost seem to hear a Great Voice saying, "These things have I placed at your disposal, that you shall not disfigure that which was made in Mine own image."

THE PROBLEM OF THE BITE.

By Prof. CARL CHRISTENSEN, Copenhagen, Denmark.

THE problem of finding a rational principle for determining the *path of the bite* in artificial dentures* I have here called the "Problem of the Bite." Accordingly, it is the factors determining the nature of the bite-path which are to be considered here.

If, instead of using the prevalent general term "articulation," or the special term "occlusion," I have chosen to use the word "bite" as a general term for the present subject, it is simply because experience has taught me that neither of these ("articulation" and "occlusion")

* In order to avoid exhaustive explanations, it is pointed out at once that here and throughout this article reference is made to *complete* dentures only.

at present answers the purpose, for the great majority of dentists, when a thorough explanation of the subject is attempted.

The word "bite," Latinized by Carabelli as *mordex,* pictures involuntarily to the mind the mutual touch of the biting surfaces of the opposing teeth as it takes place when the mouth is to be closed and the rows of teeth meet; and as it is this very condition which here requires a plain designation that may be perfectly understood by everybody, I have preferred to adopt this word, which seems to me to be the simplest and most natural, and for that reason the most suitable one.

I use the word "bite," then, as a general term for all the forms of contact in which both rows of teeth may meet, wholly or partially. If the bite be produced by a simple closing of the mouth with the lower jaw in a naturally retracted position, I call it "resting bite;" if produced by the moving process which normally takes place during biting and mastication, I call it, in contrast, "moving bite." The bite with the lower jaw moved forward I call "forward bite," and with the lower jaw carried to either side, "side bite." Other terms in connection with the word "bite" will scarcely need a special explanation.

According to its nature, the problem of the bite would seem to be so much within the pale of the palpable that it might be solved in a mere empiric manner; but in reality the question presents difficulties which the art of practical dentistry cannot expect to surmount to perfection without the special assistance of the anatomist and the mathematician. It would therefore be in favor of a perfect solution of this question, if co-operation of these three forces were secured. In similar cases the combined efforts of the anatomist and the mathematician have given exceedingly favorable results. In the attempts made toward a scientific treatment of the bite problem up to the present time, the mathematical element which should produce logical clearness is lacking—for our own amateur mathematicians have rather rendered more dense the fog surrounding the matter.

During the course of time, correct and excellent observations regarding the factors bearing on the problem of the bite have been presented, even though sprinkled with immature thoughts and erroneous ideas. A comprehensive survey capable of collecting these scattered truths and bringing them into mutual harmony must be the object of research in the domain of the bite problem.

On the way to reach this objective point the present work will hardly be of decisive importance, but as a contribution toward a practical conception of the matter I hope that it will be of value to interested readers.

PRACTICAL INTEREST OF THE PROBLEM.

The problem of the bite is not only of theoretical but also of practical interest to the dentist; and if the great majority of practitioners nevertheless consider the question to be of mere theoretical importance, such attitude is simply caused by the fact that the dentist who makes at all accurate work will in most cases succeed in producing a denture which to a certain extent satisfies his client, and this he can accomplish without diving into the mystery of the bite problem, provided he takes care to get the resting bite in perfect order. This more or less successful result, however, must partly be attributed to the facility of the patient in question in getting used to the artificial teeth and adapting himself to them.

An artificial denture which only "fits" in the resting position requires, as a rule, that the patient must become not only accustomed to unnatural masticatory movements, but to a change of form—for an adaptation also of the temporo-maxillary articulation itself, according to the differing requirements of the denture's bite-path, does evidently often take place.

There will, however, always remain a relatively large number of cases where the patient's ability for becoming accustomed to the requirements of such a denture fails, to a greater or less extent, and where the denture for this reason does not give full satisfaction as a masticatory apparatus. It is in such cases

absolutely necessary for us to produce a denture with a bite which really fits the patient; but we must, moreover, remember that we always ought to aim at bringing the denture's masticatory effectiveness as near the naturally normal as possible, and a rational solution of the bite problem has surely here a much-needed mission which may be said to be of general practical interest.

Different prominent writers on our subject—as Bonwill, Sternfeld, and others—base their works on the supposition that artificial dentures ought to imitate the natural prototype as much as possible, because they consider it as granted that a nature-like imitation of the natural denture's bite-path will give the artificial denture the highest possible effectiveness in mastication. While the practice of most dentists fully proves that they do not entertain this opinion, the theory about the suitability of a perfect imitation of the natural prototype as the ideal requirement is nevertheless that which characterizes the vast majority of the publications treating of this subject.

This theory, however, presents the peculiarity that it is the ideal natural denture on which the writers fix their attention, while they pay little or no regard to the individual race and family peculiarities or the pathological types which we daily meet in practical life. The Procrustean idea to form all cases after a normal type is, of course, very misleading; but even if we modified this theory, allowing for typical peculiarities, and even if we were able to comprehend and determine how the typical normal denture for each separate individual ought to have been designed by nature, it is still more than doubtful whether this fine theory about imitation of nature would stand the test when applied to the construction of the artificial denture. For the dogma about nature's absolute superiority cannot, in fact, be followed blindly when the imitation, as is here the case, is going to operate under essentially changed conditions. It is not sufficient that we here follow uncritically the supposed directions of nature, but we must attempt to solve the question by soberly considering the mechanical conditions which present themselves, and base our work on general mechanical (kinematic) principles.

We must bear in mind that the mechanical task—the comminution of the food—requires other and in a certain sense more important qualifications of the bite-path in the artificial dentures than in the natural. For the artificial denture is not firmly attached to the jaw, as is the natural, but precisely by means of the suitable form and position of the bite-path is the denture to obtain its firmness—the essential support for its accurately balanced position which is the necessary condition to render it capable of performing the incisive and masticatory movements at all without becoming displaced.

For this reason the form of bite-path which in the natural denture presents the best conditions for excellent masticatory effectiveness may, if transferred to the artificial denture, render the latter unserviceable.

If it were only a question of securing a properly balanced position during the resting bite the matter would be quite simple; but as it is demanded of the artificial denture that it be capable of masticating—that is, grinding the food, and not merely crushing it—then it must also be required that it be capable of operating with masticatory movements that are as natural as is possible, and not with the stamping, "straight up and down" movement only.

The balance of the artificial denture depends on the biting surfaces of the rows of teeth meeting each other simultaneously when the mouth is closed, and to a sufficient extent to insure that the rows of teeth during resting bite as well as side bite and forward bite shall continually retain the necessary contact without causing the denture to rock or to become displaced in the mouth.

The condition essential in order that the denture may be capable of retaining this "contact" during the different phases of the bite is that the form of the bite-path shall correspond exactly to a certain form of the jaw-movement.

Most writers who, appreciating this condition, have studied the movements of the jaw for the purpose of discovering the correct principle on which to construct an "anatomical" articulator have had a vague idea about its being the chief point to get a clear conception of the masticatory movements as a whole.

This problem, the analyzation and determination of the masticatory movements—which, by the way, has not been solved satisfactorily yet, owing to the minute and complicated nature of the real masticatory movements—is, however, so distant that it does not concern us just now; it must be left to future investigators to apply the full benefit of the knowledge acquired to these minute movements. Before we can proceed to consider them we must first endeavor, within a more limited domain, to find a firm foundation to build on. We must first seek to select from the chaos of masticatory movements that which is essential to our purpose; that is to say, we must try to isolate for our consideration that special form of movement which is of the most importance to the bite.

THE FORMS OF MASTICATORY MOVEMENT WHICH DIRECTLY INFLUENCE THE BITE.

It can consequently be only those forms of movement which directly influence the bite which we now require and on which we are to build. For the "bite" is a mutual contact between the rows of teeth, and consequently we may exclude the consideration of any movement at all which takes place after this contact has ceased. It is only at the moment when the state of contact—the bite—commences that the movement becomes of importance to the bite; therefore it is only what we may call the "bite movement" (not the biting movement), *i.e.* the movement during the bite, which is to be isolated for our consideration; and it is likewise the path of the moving-bite only with which we must become acquainted. It is therefore what the anatomists call displacing movements that we have to reckon with, and only those displacing movements which may be performed with the rows of teeth pressed into contact with each other.

The jaw's opening and closing movement, on the other hand, we need not consider at all, because, even with an irregular bite-path the movements during which the bite is still retained will always be too minimal to change materially the character of the joint-path as it will appear during the bite movement.

If, however, the efforts of most writers to give a clear understanding of opening and closing movements have, so far, entirely dominated the interest for the displacing movement—the "bite movement"—this is probably caused by the writers having been governed too much by the fact that a greater change of the height of the bite, during the work in the articulator, changes the nature of the bite, and that consequently it would be absolutely ideal if we could secure a perfect anatomical imitation of all jaw-movements.

This consideration is, fortunately, quite superfluous provided that when arranging the denture we secure the height of bite required of the denture before we determine the final construction of the bite-path. A slight deviation from the selected height of bite will not produce a noticeable change in the nature of the bite, provided the axis of the articulator's opening movement be not moved too far from the natural position.

So far the scientific literature at hand treating of the jaw movements does not give us sufficient assistance for understanding the special form of movement called for here, viz, the displacement with the rows of teeth kept in contact—the movement which for the sake of convenience I call the bite movement.

The study of the jaw movements, which in itself presents extraordinary difficulties owing to the complicated mechanism of the temporo-maxillary articulation, is rendered especially difficult by the bite movement. For, while the jaw movements which may be performed outside of the bite—that is, with the rows of teeth parted from each other—only depend on the muscular spasms and the mechanical nature of the joint, in the bite movement, on the contrary, it is the

form of the bite surfaces which exercises a decided influence on the form of the movement.

And as, now, the path formed by the bite surfaces in the natural denture—that is, the bite-path—does not only differ individually, but, with exception of the very rare cases in which wear during the course of time has succeeded in giving it a smooth form, it will always be rather uneven and in a certain sense irregular, so this renders the study of the bite problem still more difficult, and results in the view of the movement becoming correspondingly confused.

A single writer, nevertheless, F. Graf v. Spee, in his work on the displacement path of the jaw ("Die Verschiebungsbahn des Unterkiefers am Schädel," *Arch. f. Anat. u. d. Physiol.,* 1890), has succeeded in forming a clear view of the movement in a single instance, and has thereby pointed out the correct means of understanding the principle of the movement.

Other writers have taken but little notice of Spee's work, and the few who have noticed him have underestimated its importance, which probably is caused by his being chargeable with a few obvious errors.

Spee ought to be credited with pointing out the important and at the same time very simple truth, that the path of the condyle during the bite movement must be in conformity with the bite-path. As to this he says in one place: "Die Form der Schliff-fläche der Zähne entwickelt sich in Folge ihrer Verschiebung an einander und deswegen auch *conform der Bahn,* in welcher die Zähne des Unterkiefers dabei *bewegt* würden. Dieselbe ist nun aber, da die Zähne in Kiefer als feststehend angesehen werden müssen, nicht nur der Ausdruck für eine Bewegung der Zähne sondern auch für eine Bewegung des ganzen Unterkiefers."

His study of the profile of the cranium led him on to the view that the lower jaw during forward and backward displacement is swinging as a pendulum on an axis which must be imagined to go through a point in the orbit somewhat back of the lacrymal crest, and that the biting surfaces of the teeth and the front part of the condyle therefore will describe paths which very nearly follow the very same cylindrical surface. ("Sich auf demselben Cylindermantel bewegt haben.")

This observation, however, relates only to a cranium with a pronounced "upward" concave bite-path, and from this alone it may be seen that the observation does not hold good in all cases; but this does not diminish the value of Spee's work, for it is his *mode* of observation which gives the research its great worth.

Spee's view of the nature of the jaw-joint during movement is more of a mechanical than an anatomical character, and he himself points out that there seems to be a discrepancy between his hypothesis and the accepted conception of anatomical conditions; thus, opposing Langer's opinion regarding the form of the condylar path during bite movement, and from a mechanical point of view, he here presents his special conception of the co-operation of the meniscus for removing the discrepancy.

The above must be sufficient for indicating how Spee has opened the way for a simple and practically suitable consideration of the nature of the movement, which path I have subsequently pursued still farther, and have thereby been led to a somewhat different conception of the nature of the movement in question.

THE WRITER'S HYPOTHESIS.

In presenting my hypothesis, I beg to remark that I deem it unnecessary to present any suppositions in order to bring harmony between the prevailing views of the mechanical nature of the temporo-maxillary articulation and my theory of the path of the bite movement. It is my opinion that the proof of the correctness of the hypothesis can only be reliably demonstrated by observation of the movement-phenomenon itself as it presents itself during the motion of the rows of teeth against each other; for it must be remembered that the minute details of the articulation's anatomico-mechanical nature—which are to be considered here in

the living individual—are still a closed book to us, and for this reason are hardly suitable as the real basis for our line of argument.

It is, consequently, the paths of the jaw during the bite movement which we propose to determine; it must, however, be remembered that we here always speak of the matter in connection with artificial complete dentures; and it will therefore not be the accidental, more or less normal bite-path in a mouth with natural teeth, but on the contrary the movement-path corresponding to the individually ideal bite-path in a toothless mouth which we are to find, *i.e.* the path the main features of which we are to follow in the construction of a denture.

We must first examine more closely the relation between the bite-path and the bite movement, and we shall then see how such an imagined ideal bite-path in a toothless mouth must necessarily be formed and situated—if we consider the matter from a mechanical point of view without regarding our merely conjectural knowledge of the details of the peculiar mechanism of the condylar articulation.

We know for certain only the main features of its forms of movement, but we do know that the displacement of the jaw consists essentially only in the forward and backward displacement, or, if only one condyle be carried forward, of a corresponding revolving of the other condyle *almost* on the spot; actual side-displacement, however, we may consider as excluded.

If, now, with these forms of movement in view, we in a merely abstract way consider the jaw's bite and joint mechanism as a whole as it really is, in a mechanical sense—two separate and rigid parts, an upper part and a lower part, that touch each other at three places separated from each other, corresponding to the bite-path and the two joints—then we have a simple schematic view which as a general formula may serve us in explaining the matter.

In the bite-path the contact takes place under the form of surfaces, but in each of the two joints it must be considered as the touch of a point, the condyle (the lower part's) against a surface (the upper part's joint-surface).

If now, as we will suppose, the ideal bite-path in this view is of such a form that contact between the bite-surfaces is completely maintained during displacement, then the form of this path must be one of the two: either *plane* or *spherical*. (As a plane in a mathematical sense may be considered a special case of a spherical surface, *i.e.* a spherical surface with an infinite radius, we can, for the sake of convenience use only the term spherical).

Spherical surfaces are, namely, the only form of surfaces which will admit of any displacement of these against each other in the direction of movement indicated by our figure, unless the contact between the surfaces be partly discontinued.

The bite-path in our imagined view does really form what Henke calls "a joint-connection with grinding (*schleifende*) contact-surfaces," and the fundamental principle for constructing these surfaces is expressed as follows: "They must be capable of moving without describing anything but their own ideal continuation."

On this theoretical supposition I base my opinion that the path for the jaw's bite movement—therefore also the ideal bite-path—must always follow spherical surfaces, if it be possible to obtain the necessary extensive contact at all; but it must be remembered that these spherical surfaces have an individually different curve, ranging from an almost plane surface with an infinite radius to the much curved surface with a radius of a few inches.

EXPERIMENTS CONFIRMATORY OF THE PRINCIPLES HERE ENUNCIATED.

I will now show how that by means of practical experiments I believe myself to have obtained proof of the correctness of my theory. It would be too circumstantial to go into the details of the many subordinate questions which properly ought to be considered in the explanation of the experiments I have made, of which I shall only briefly mention two.

The idea I have taken from R. Fick's* method of showing that the joint-surfaces in the human organism, through the action of the muscles, may be said to receive a suitable form by grinding against each other. This method consisted in his causing plaster-of-Paris casts to move against each other by means of cords corresponding to certain muscular spasms; this resulted in the casts assuming the same form as the corresponding joint-connections in the human body.

This method I adopted for my first experiment in the following manner: I first fixed two plaster blocks with plane ends in my "rational articulator," in such a manner that they fitted together in the resting position. I then gave the articulator's joint-path the specially oblique position which later on we shall see is the one corresponding to a curved bite-path, and carried and displaced them, maintaining a firm pressure against each other, through all the directions of the moving bite, so that they ground each other into shape. When, finally, the grinding was accomplished the surfaces presented the form seen in Fig. 1, which is engraved after a photograph of the preparation. The worn surfaces now showed perfect contact during all bite movements and presented also apparently spherical surfaces. This "indirect proof" was confirmed by a similar experiment which I carried out on a living subject, a man whose natural teeth presented a somewhat worn, slightly curved, but for the rest a not very smooth bite-path. I covered the rows of teeth with thin pieces of rubber and melted on to the bite surfaces of these—the upper as well as the lower—a layer of wax a few millimeters thick, and this I lubricated by the application of soap, and I now let him execute bite movements—consequently all possible displacements of the jaw—with the rows of teeth pressed lightly against each other.

Figs. 2 and 3 (which like Fig. 1 are engraved on wood after a photograph), though the case is not very pronounced, show the result, which demonstrated the correctness of my theory just as plainly as the previous one. Both blocks have obtained the character of spherical surfaces, one concave and the other convex, corresponding to the lower and the upper part of the mouth. I do not claim that these experiments have been carried out with the absolute accuracy required in real scientific work, but, as already remarked, we are here aiming at a mere practical conception; and, practically, my experiments will at all events compare favorably with the accuracy with which the work as a whole, in artificial dentures, can be executed at all.

* R. Fick, "Ueber die Form der Gelenkflächen," 1890.

THE CONSTRUCTION OF A RATIONAL ARTICULATOR.

If we now believe we have found the fundamental principle for the path of the bite movement in general, the next step is to see how by means of this we may be able to learn the exact individual form presented by the path in each special case. This leads us up to the question of the principle for the construction of a rational articulator.

In order to understand what is the essential in the construction of such an articulator, I will here try to explain precisely what is required of it:

The articulator must be the technical medium for presenting a correct view of the individual bite movement by means of the casts. That is to say: It must be possible by means of the articulator to bring the casts into the correct relative positions corresponding to the different phases of the bite.

This requires in the first place that the articulator's joint-mechanism imitate the very form of the condylar path as it is during the bite movement; and secondly, that this joint-mechanism and the casts may be brought into relative positions which correspond to the natural conditions in the individual in question.

Bearing this in mind, we will now look at the accompanying cranium, Figs. 4 and 5, which by inscribed circular lines indicate the schematic profile of the form

of the bite movement in two different supposed cases.

We will here first notice that the two joint-paths, *b, b,* in Fig. 4 and Fig. 5, with respect to actual form are almost alike, inasmuch as they both, though in a mathematical sense following circular lines, may yet, owing to their shortness, practically be said to follow straight lines.

From this we learn that it would be of very little importance to try to individualize the form of the joint-path itself in the joint-mechanism of the articulator. A joint-path following a straight line will in the articulator, in all cases, give a view of the natural form of the joint-path during the bite movement which is sufficiently accurate for practical purposes.

On the other hand we shall see that there is a remarkable difference between the position of the two joint-paths (*b, b*) in relation to that of the respective bite-paths (*a, a*).

FIG. 1.

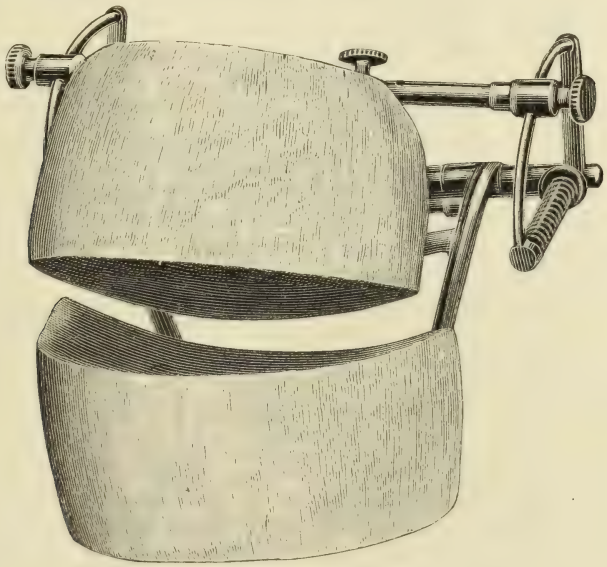


FIG. 2.

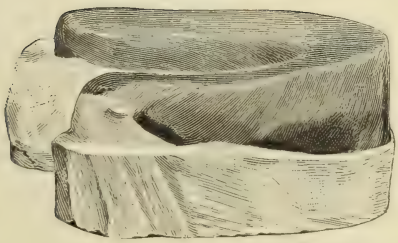
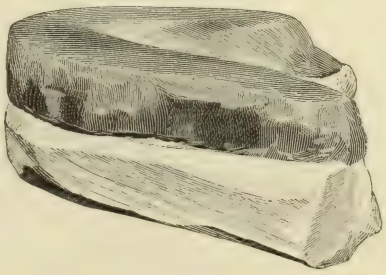


FIG. 3.



While the joint-path in Fig. 4 shows an inclination of about 45 degrees to the horizontal line, the joint-path in Fig. 5 takes up an almost horizontal position. It will consequently be this individually different degree of inclination of the joint-path which must be considered decisive in determining the form of the bite-path, and which it is essential to learn precisely in the individual, and to

Fig. 4.

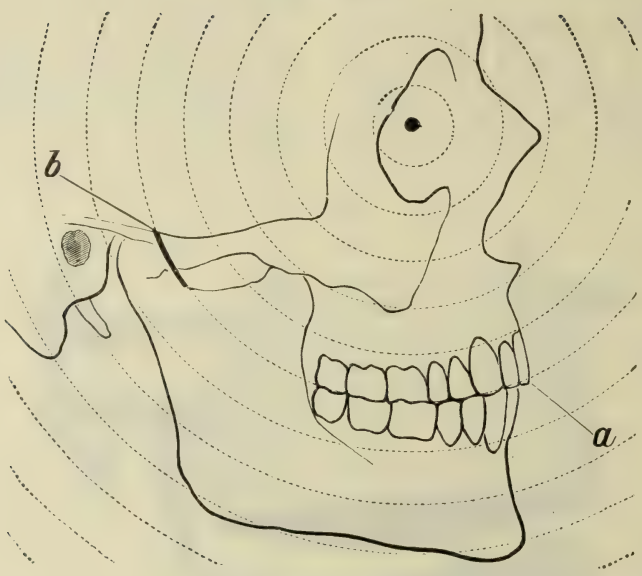
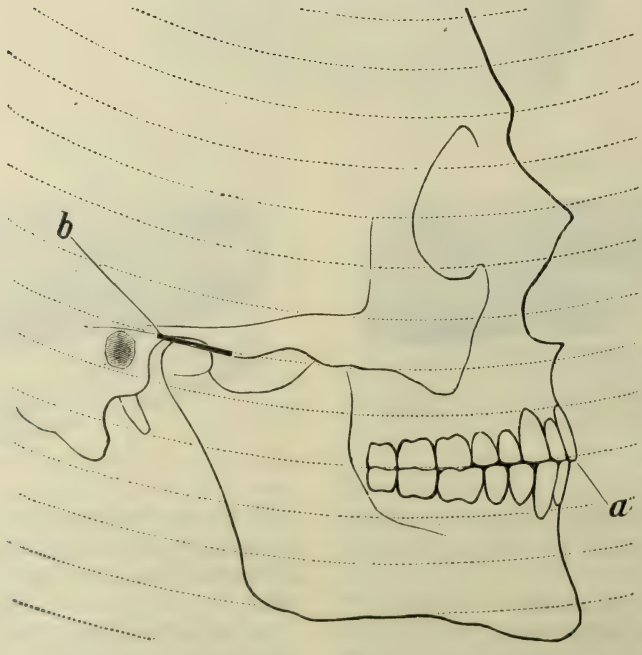


Fig. 5.



be able to describe exactly in the articulator's joint-mechanism.

In order to illustrate more plainly this relation between the form of the bite-path and the direction of the joint-path, and also for showing how it is made pos-

sible to find and determine this relation individually, the Figs. 6–11 are shown (see pages 1194, 1195).

These figures are from photographs of a schematic phantom, which is made of a metal plate on which is cut and drawn the profile of a cranium with a displaceable lower jaw attached.

In this plate, at the approximate place of the jaw-joint, is made a slot shaped as a horizontal V and forming two straight-lined paths (joint-paths) running in different directions, but having their starting-point in common. In this slot is placed the lower jaw by means of a metal pin soldered to the condyle and fitting the slot, so that it does not wabble; this allows the lower jaw to be carried into the different bite positions without wabbling.

These two paths, which on account of their positions I will call the "steep" and the "horizontal" joint-path, represent *two different joint-paths*—that is, in two different individuals—and they will very closely indicate the two extremes which it is possible for any degree of the joint-path's inclination to assume.

The parts of the upper and lower jaws in which are fixed the respective rows of teeth are, moreover, removable in order to admit different sets of teeth, with differing bite-paths, to be presented in the same cranium.

In Fig. 6 the phantom shows a denture with a curved bite-path in resting position.

In Figs. 7 and 8 is seen the same denture in forward bite position, but in Fig. 7 the jaw is carried along the steep and in Fig. 8 along the horizontal bite-path.

In Fig. 9 we see the set of teeth used in the previous figure substituted by a set with a straight bite-path. The jaw is here in the resting-bite position.

In Figs. 10 and 11 we see this set of teeth in forward-bite position with the jaw carried forward along the horizontal and steep joint-paths respectively.

In Figs. 7 and 10 we see how the two different dentures retain perfect contact during forward bite, owing to their bite-paths being formed corresponding to the respective joint-paths along which the jaw is carried. In Fig. 8 and Fig. 11, on the other hand, we see how the contact during forward bite is made impossible if the bite-path and joint-path do not correspond with each other.

I presume that it will be unnecessary to give a further explanation of these imagined figures, which plainer than many words show the relation existing between the *inclination* of the joint-path and the *form* of the bite-path, and from which we can see that the deciding factor in obtaining the principle for constructing a rational articulator must be—That the joint-path of the articulator in each individual case must be capable of being adjusted to the correct degree of inclination; that is, adjusted to the position in relation to the casts corresponding to the natural condition in the special case.

The rational articulator must, consequently, be provided with sliding joints, by means of which the displacement path of the condyles during the bite movement may be imitated, and these sliding joints must be capable of being adjusted to different degrees of inclination in the sagittal plane (and independent of each other, because the inclination of the joint-path in the same individual is not always the same in the right and the left side).

As I intend in a later article to treat the practical side of the question, and in order to be brief, I shall not here go into the details of construction of the articulator, but only refer to my former publications on this subject, among others "A Rational Articulator" (*Ash's Quarterly Circular,* December 1901, and *Dental Revy for Scandinavien,* 1902).

I shall, however, by means of the phantoms briefly endeavor to show how the individual inclination of the joint-path may be found.

If we look at Fig. 11 (in which the displacing movement is carried along the steep joint-path), showing the set of teeth with the straight bite-path, we notice that an intermediate space between the rows of teeth has been produced by the forward displacement correspond-

ing to the lowering of the back part of the lower jaw produced by the inclination of the joint-path. From this we see that the less steep the joint-path's inclination horizontal joint-path, no space appears, as a matter of course, because no "lowering" of the jaw has taken place.

The relative positions occupied by the

Fig. 6.

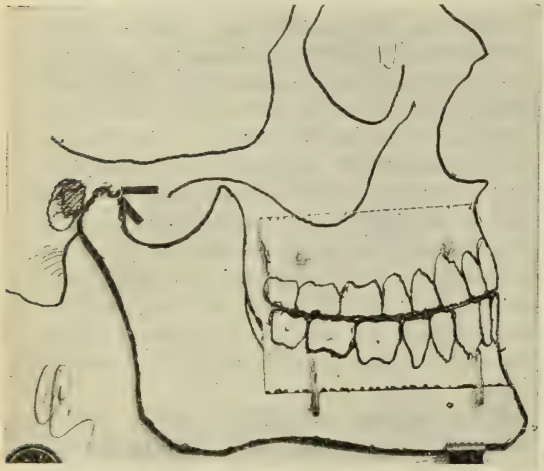


Fig. 7.

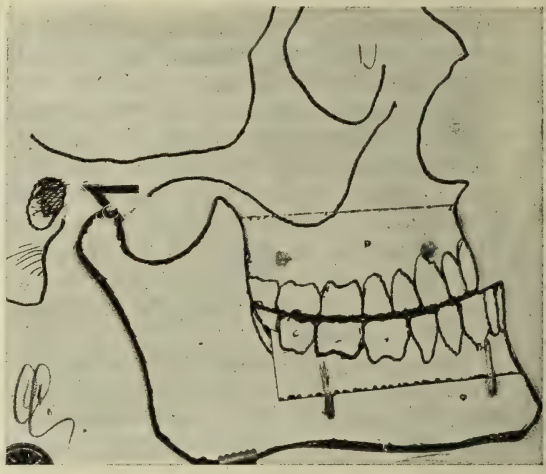


Fig. 8.

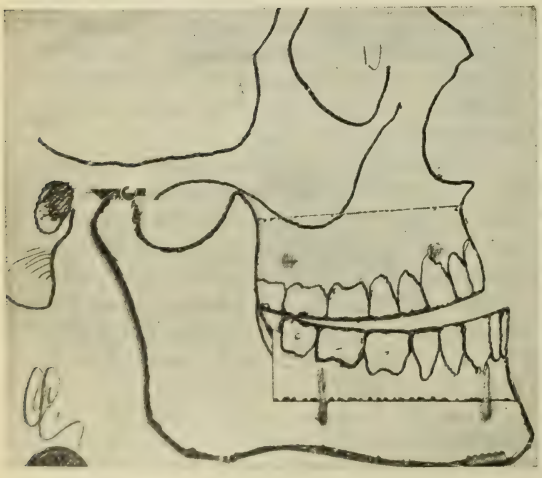
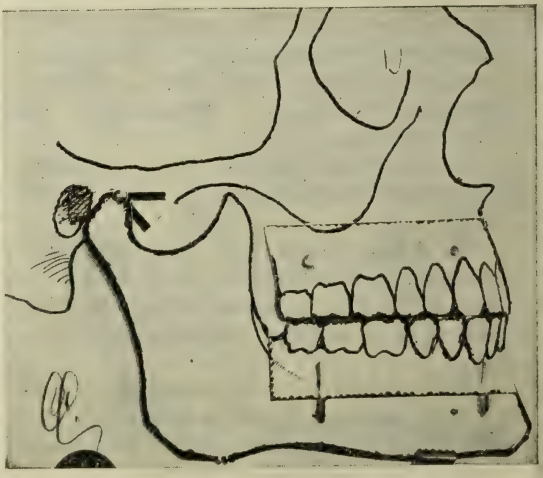


Fig. 9.



is, the less will the lowering of the jaw be, and the smaller will the space be backward between the rows of teeth shown.

In Fig. 10, in which the forward-bite movement is shown as carried along the rows of teeth at forward bite express in this manner the change of position which has taken place with respect to the entire jaw; and this renders it possible to read off the direction, *i.e.* the degree of inclination of the path which the con-

dyle must have followed during the forward displacement.

Every point of the lower jaw, and therefore also the point indicating the condyle, will, then, in the resting-bite position indicate a starting-point, and in the forward-bite position a terminus of the movement performed, and as far as the condyle is concerned this means that we have learned the direction of the line it has followed during the movement.

This geometrical experiment, which is here assisted by the schematic figures, is carried out practically by means of the "rational articulator" as follows:

When by means of the trial plates we have secured the correct bite in resting position in the usual manner, and then fixed the casts in the articulator, we have secured the correct relative positions of the casts at resting bite, and have at the same time, in the articulator's joint mechanism, secured the determined starting-point for the movement.

If we now, by placing a suitable amount of impression-wax on the bite surface of the trial plates, and by letting the patient perform forward bite with these, mark the positions at forward bite of the trial plates, then, when these are again placed on the casts in the articulator we shall thereby have the means for determining the direction (inclination) of the joint-path; for it will now only be possible to bring the trial plates (or casts respectively) into the arranged forward bite position when the articulator's sliding joint is placed in a direction allowing the articulator's "condyle" to come into the position corresponding to the determined terminus of the performed movement.

There is here, however, no space for the necessary practical directions for performing this manipulation, and at present I must be contented with referring to what I have formerly written about it in the above-named treatises. As already stated, however, I hope in a not too distant future to find an opportunity for continuing the present essay by treating of the more practical side of the question.

Fig. 10.

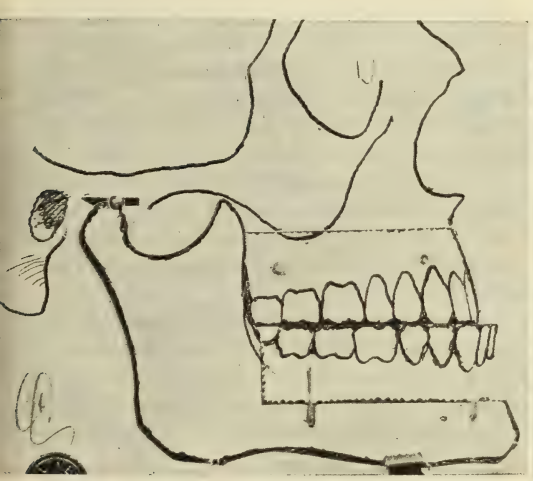
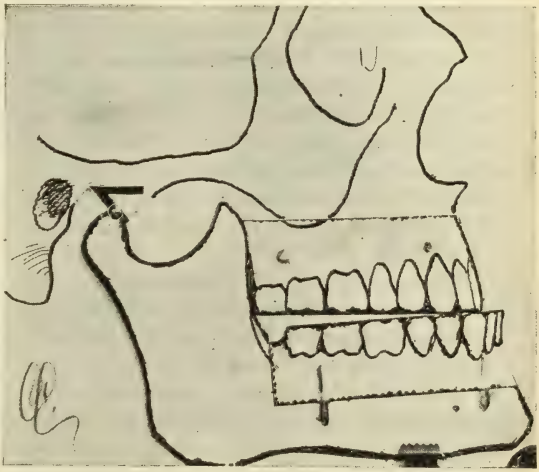


Fig. 11.



THE TECHNIQUE OF PULP-REMOVAL AND ROOT-TREATMENT ASSOCIATED THEREWITH.

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(Read before the Connecticut State Dental Association, at its annual meeting, April 18, 1905.)

THE evolution of dental science during the past twenty-five years has wrought many changes in the technique of pulp-removal and its associate operations and treatment. Dental chemistry has rescued this important field from the plane of empiricism and placed it on a level with the other scientific work of our profession. This is the one field of our labor that is not absolutely open to visual inspection, and this accounts to a large extent for the reluctance and fear with which the work is generally undertaken.

The majority of the profession have had such a large percentage of failures that one might suppose they would seize with avidity upon all scientific advancements in this field of operative procedure. Unfortunately, this is not the case. What meed of success the average man possesses, he soon discovers to be due to painstaking and thorough work followed along well-defined paths, and he fears in consequence the slightest departure from his accustomed lines of procedure. As a result of such conditions the major portion of the profession today practice methods but little removed from empiricism.

Our studies of minute anatomy and pathology have taught us the necessity of the aseptic removal of all organic tissue contained in the pulp-chamber and the root-canals, and as much as possible from the canaliculi. These openings are then to be hermetically sealed in an aseptic manner so as to prevent the ingress of any micro-organisms. The accomplishment of this result is an absolute necessity in order to insure a successful operation.

In straight single-rooted teeth such results are easily attained, but as we diverge from these to more irregular forms of multi-rooted teeth with their variations in shape and size not only of the root itself, but of the area of the canal in which the pulp tissue is contained, we are beset by greater difficulties. It may be stated at the outset that with the aid which chemistry has furnished us, there remain but a very few of the most irregular types of roots which cannot be thoroughly cleansed of their pulp-contents. There are many scientific ways at the present date by means of which this important labor can be properly accomplished.

In presenting one of these methods for your consideration, I do so with the confidence begotten of thirteen years' successful practice in the entirety of this technique, and a portion of it extending back a period of over twenty years. It was about the year 1884 that I ceased using carbolic acid or creasote in any form in root-canal work, because I was opposed to the preserving of organic tissues which at some future date would tend to discolor the tooth-substance even if it did not become the prey of bacterial infection. The simple technique which I have the honor of presenting to you has resulted from a gradual evolution based on the principle which I have previously enunciated of the absolute removal of all organic contents.

As in all operations where infection plays a prominent rôle, it is necessary to use every available aseptic precaution. The hands of the operator should be as clean and as nearly sterile as possible; the operating table should be in the same condition; the hands of the assistant should be in a like condition; all instruments that are used should be previously

sterilized and polished. In fact, all the precautions of the surgical operating room should be employed. In this respect, it is essential that no work should be done upon the tooth until the rubber dam has been applied. This should be an invariable rule in any work involving pulp or canal treatment at any period.

It is essential to separate into two divisions the removal of pulps, those that may be living and those that are dead.

REMOVAL OF LIVING PULPS.

The removal of a living pulp is generally accomplished by one of two methods, the application of arsenous acid, or the anesthetizing the pulp with cocain hydrochlorid. The use of arsenous acid has become so nearly obsolete, recourse being had to it only in such cases where for some reason or other cocainization is an impossibility, that on account of lack of time it will not be considered.

It is not the purpose of this paper to enter into the detail of the different methods of reaching the pulp, and of the technique of pressure anesthesia, except to say that after a pulp has been exposed it is necessary to use due precaution in the use of pressure anesthesia to avoid two things. First, to guard against the danger of forcing micro-organisms with the anesthetic through the end of the root, or sometimes through the approximal sides of the tooth into the soft tissues. Second, every precaution should be taken not to force the anesthetic itself so far that it would pass the confines of the end of the root. Under such conditions a much more favorable outlook for the comfort of the patient can be guaranteed for the next few days than where the anesthetic has been carried well up into the periapical region.

It is a common error to use pressure against the cocain solution for too long a time. In case a portion of one of the walls is missing, it is replaced artificially by use of soft stopping, gutta-percha, or unvulcanized rubber, so that the pressure of the rubber can be made directly against the pulp without danger of the fluid finding an outlet in some other direction. Under such conditions an application of pressure lasting only from five to twenty seconds will produce profound anesthesia of the entire contents of the pulp-canals; while the prolongation of pressure brings with it the liability of forcing the medicament through the foramina.

In all cases of pulp-removal the first essential is to outline the amount of opening that is necessary in order to give direct access to the orifice of each root-canal. This necessitates the free cutting away of every portion of the tooth-substance that may interfere with the accomplishment of this object. This should be done at the outset, as it serves to make the pulp-chamber more accessible and to simplify all following operative procedure. There is no excuse for violating this fundamental principle, and yet this is where a great many make their first blunder. Failure to freely expose the orifice of each canal makes it a physical impossibility to thoroughly remove its contents. Conserving of a small amount of tooth-structure is of little value if it is to be followed by an alveolar abscess.

In the posterior teeth the free opening of the pulp-chamber with a fissure bur generally results in the removal of most of the contents of the pulp-chamber. If this has been properly done, we now have exposed to view the orifices of the different canals. A Donaldson pulp-canal cleanser of the right size is now selected, care being taken to carefully inspect it with a magnifying glass for any possible flaws that may exist where the barbs are cut. There being no question of the absolute sterility of this broach, it is now delicately passed up the side of the canal, and after it has proceeded as far as possible the broach is turned around with the greatest delicacy in order to twist the fibers of the pulp around the barbs. This twisting movement is persisted in until the broach is supposed to have reached the end of the canal, when with the same regard to delicacy of manipulation it is withdrawn, and should have the pulp wrapped around it.

There is a great variation in the ease and thoroughness with which the pulp

in different canals can be removed on the first attempt. Any difficulty of removal is dependent on two conditions, the vitality of the patient and the presence of nodular masses in the pulp tissue. Under such disadvantageous conditions it frequently happens that the pulps in the different canals will have to be removed in different sections. Having reached the stage of instrumentation where it seems impossible to bring away any more pulp tissue, this method of procedure is abandoned, and recourse is had to chemical means for the purpose of disintegrating and destroying whatever organic tissue remains between the pulp-chamber and the end of the root.

REMOVAL OF DEAD PULPS.

Reverting now to the other class of cases, where the pulps are dead, the procedure so far as opening up the cavity is concerned varies but little from what has been above outlined. The important point to remember in such cases is the danger of forcing infected pulp-débris through the end of the root, consequently it is important to bathe the interior of the pulp-chamber with a 10 per cent. solution of formaldehyd before instrumentation is begun. The mechanical removal of the pulp-contents in these cases is dependent upon how long vitality has ceased to exist in the pulp tissue, and into what condition it has degenerated. This may vary from the form where there still remains a tangible mass of pulp to wind around a Donaldson cleanser, to those cases where the canal is simply filled with a mass of putrescent liquid.

Having emptied the canals of their contents by instrumentation as far as possible, we find ourselves at the same stage where we left off with the removal of living pulp tissue. Whatever chemical means are now used to remove all remaining portions of organic matter, and as much of the fibrils that enter the tubuli as possible, one important point must be kept in mind, viz, that all coagulating media should be avoided until the process of disintegration has been thoroughly completed, otherwise encystment of portions of the organic matter will surely take place, to be followed in turn by more or less discoloration of the tooth-substance.

There are two chemical compounds that stand pre-eminent at the present day for the radical accomplishment of this purpose. Both were introduced into this country the same year, and their action is very similar. Sodium dioxid was introduced by Dr. E. C. Kirk in 1893, and in the same year at the Columbian Dental Congress, Dr. Emil Schreier of Vienna introduced to the profession the alloy of sodium-potassium (kalium-natrium). Sodium dioxid has the advantage when it is decomposed of combining not only with the putrescent masses in the pulp and disintegrating whatever organic products may be present, but at the same time it also sets free ozonized oxygen which oxidizes whatever coloring matter may exist. It requires, however, a great deal more care in its use, and is much more difficult to manipulate than the sodium and potassium mixture. This latter preparation was originally introduced by Dr. Schreier with the sole idea of saponifying the fats and other organic tissues and then leaving what is considered this harmless matter in the canals. This is not the form of technique I desire to call your attention to in advocating, as I do, the use of kalium-natrium.

A barbed Donaldson bristle is passed through the paraffin into the sodium-potassium and with a small amount of the latter clinging to the barbs, it is now gently passed into the pulp-canal. The water which is present is at once acted upon, forming sodium and potassium hydroxid, liberating the hydrogen, which gas can be seen escaping. The caustic alkalis in their turn act upon the fats, and the result is a sodium and potassium soap, with glycerin as a by-product. These substances are freely soluble and easily washed out of the canals. The latter process, however, should not be undertaken until all portions either of living organic tissue or decomposed putrescent tissue have been saponified. This stage is determined by the fact that the characteristic bubbling of the sodium and po-

tassium when it comes into contact with either living or putrescent matter has stopped, and the chemical compound rests perfectly inert in the root-canals.

This alloy not only decomposes and disorganizes the tissue that exists in the canals, but in the act of doing so it bores its own passage through the fine and inaccessible canals such as the buccal canals of the upper molars and the mesial canals of lower molars. Its ability in this respect for finding the end of the most tortuous canal is limited only by the skill and patience with which it is used by the operator. When it no longer finds any fibrils in the tubuli to act on, it will cease to give forth its peculiar hissing sound.

The next step is to wash out the soapy mass and any pigments that may be contained therein in order to prevent subsequent discoloration of the tooth-structure. For this purpose I used hydrogen dioxid, which takes the place of the ozonized oxygen set free when sodium dioxid is the agent used. Instead, however, of using simply hydrogen dioxid, I have hit upon the expedient of dissolving in it the most reliable germicide at our command, mercury bichlorid. For this purpose I have found the only available hydrogen-dioxid preparation to be that of Marchand. I keep ready prepared for this purpose a solution of 1 part of $HgCl_2$ to 500 of H_2O_2.

The canals are now thoroughly washed out with this solution, using a glass hypodermic syringe with platinum needles. The oxygen that is set free oxidizes all coloring matter that may remain in the tooth-structure, and on the evaporation of the solution a minute amount of the mercuric chlorid residue is left in the dental tubuli, remaining there as a permanent germicide. The canals are now thoroughly dried. A little sterile cotton or paper is placed in the pulp-chamber, the cavity is sealed with gutta-percha, and the patient is dismissed.

If, on account of lack of time, all the organic tissue has not been saponified at the first sitting, the cavity should be dried and sealed with gutta-percha without washing out the canals with the bichlorid solution. This is recommended in order to avoid coagulating any tissue which could later be disintegrated and washed out. Should some sensitive tissue remain in the canals, a dressing of one of the essential oils should be left under the stopping to obtain the benefit of its anodyne effect.

Upon the patient's return at a subsequent sitting the gutta-percha is removed, and if there be any question as to any organic matter remaining at the ends of the root-canals, the sodium and potassium paste is again applied and followed with the wash of $HgCl_2$ and H_2O_2. The canals are then thoroughly dried with heated air, a few wisps of cotton are wound around a Swiss broach, and this is dipped in the oil of eucalyptus and passed to the ends of the dried canals. The canals are again dried with heated air, which forces this varnish of eucalyptus oil into the tubuli. The Swiss broach wound with its wisp of cotton is now dipped in a solution of base-plate gutta-percha and chloroform, and this in turn is carried to the ends of the respective root-canals.

From a bath of 10 per cent. formaldehyd, a cone of gutta-percha of suitable diameter is now taken and placed in one of the canals. A root-canal plugger is then dipped in pure alcohol and passed through the flame of the alcohol lamp, which in igniting the alcohol not only warms the plugger but thoroughly disinfects it before it enters the root and presses the gutta-percha cone down to the end of the canal. Sufficient gutta-percha having been placed in the respective canals and the plugger wound with cotton wet in chloroform, it is now used to pack the gutta-percha to the bottom of the canals in one solid homogeneous mass. The object is attained when the patient feels slight pressure at the end of the root, which denotes that the liquid gutta-percha is penetrating the foramen.

A minute amount of gutta-percha, causing the most imperceptible irritation to the soft tissues, cannot be considered in the light of an irritant if the operation has been attended with due consideration to aseptic surroundings. Its well-known

compatibility with the soft tissues renders it the most suitable material for this purpose.

The end of the root is now hermetically sealed, and in order to provide against any possible infection from without, the gutta-percha is covered with a cement of zinc oxychlorid; over this any other operation may be proceeded with.

The above simple technique is presented to your consideration as being based upon true chemical principles, and has the advantage of a record of many years of unparalleled success.

The object of not filling the root at the first sitting is to determine positively whether all particles of organic tissue have been removed. Where the pulp is alive it is impossible to be sure of this at the primary operation, because the contractile property of the cocain preparation is so great that it frequently only temporarily effaces some minute portion of living matter. On the other hand, in putrescent pulps it is frequently impossible to determine at the first sitting how far infection has proceeded.

We now come to another phase of our subject, and that is where the germs of infection have passed through the foramina into the periapical region. These are the cases which commonly give trouble to the most careful operator. This infected zone unfortunately exists owing to the fact that there has been no disturbance of the parts until the canals are cleaned. It matters little with what care the cleansing of the pulp-chamber and the canals may be attended to, should infection exist in the periapical region which has not been diagnosed by the operator the sealing up of the tooth will soon be followed by the characteristic soreness and tenderness which precedes an alveolar abscess.

It is on this account that the patient should be cautioned to return at the first suspicion of tenderness in the region operated upon. Having determined that this zone of tissue on the outer periphery of the end of the root has become infected, even though no abscess has ever taken place, our attention is now directed to the destruction of the micro-organisms that exist in this locality, as well as the cauterization of the diseased territory.

ELECTROLYTIC DESTRUCTION OF MICRO-ORGANISMS.

In 1897 I first published in *Items of Interest,* a method for accomplishing this purpose which I have found invaluable. Cataphoresis for anesthetizing dentin was then one of the constant themes of dental discussion. Employing a cataphoric rheostat, I made use of it for the purpose of electrolytically destroying these germs. The method of procedure is as follows: The cathode sponge being placed under the rubber dam holder against the cheek, an anode of chemically pure zinc is passed to the end of the root-canal, which has been kept wet with the hydrogen dioxid solution. The current of electricity is now turned on, and the voltage gradually raised until from one to five milliamperes of current is passing through the end of the root as denoted by the milliammeter. This current is left turned on from three to seven minutes according to the exigencies of each case.

The action of the electricity upon the chemically pure zinc not only forces the galvanic current through the end of the root into the infected area, but there is carried with it the zinc oxychlorid which is formed by the decomposition of the zinc. This active germicide itself not only electrolytically destroys all micro-organisms, but cauterizes the pathogenic area. So positive is this treatment in my hands that it is immediately followed by the sealing of the end of the root in the manner above described, and while there may be some slight subsequent irritation due to nature's absorption of the coagulated tissues, this is soon followed by the complete cure of the diseased area.

This method of technique was brought out a couple of years ago in Europe by Prof. W. D. Miller of Berlin, and during the last International Dental Congress at St. Louis, a paper on the same subject was presented by his assistant, Dr. Kurt Hoffendahl of Berlin. The difference between the method suggested by them and

the one presented by me in 1897 consists in their using the platinum point instead of the chemically pure zinc point which I advocate. While there is no question of the destruction of the germs by the simple treatment of the galvanic current, still the coagulation of the infected and frequently necrosed tissue by means of the zinc oxychlorid is of the greatest advantage.

This method of sterilization is also recommended to those operators who find it impossible to penetrate to the ends of very fine canals, as the surest means of leaving the contents of those canals in an absolutely sterile condition.

DENTISTRY IN JAPAN.

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(Presented to Section IX, Fourth International Dental Congress, at St. Louis, September 2, 1904.)

I. General Statement.

AT the opening of a statement of the status of dentistry in Japan it may not be out of place to devote a few words to the dental art practiced by the Japanese in former times. In Japan, dentistry had its origin somewhere about two hundred years ago, when it was practiced as a branch of medicine and was then known as *kochiu-kwa,* or stomatology. Our medical science at that time, though primitive in its theory and practice, was classified into eight divisions: (1) Medicines for adults; (2) Pediatrics; (3) Gynecology; (4) Stomatology; (5) Ophthalmology; (6) Surgery; (7) Acupuncturing; (8) Massage. But the medical operation of stomatologists seems to have been limited to the extraction of diseased teeth, the remedying of toothache, and somewhat simple treatment of the various diseases of the mouth by a primitive mode.

At the present day it is not an easy task, even for the Japanese, to obtain full information as to the medicines these stomatologists used, and the artistic skill exercised in the execution of their dental operations. This is due to the fact that they seldom had any written form of instruction and that they had no textbooks. After diligent research the writer has found a few of the dental tools used by these practitioners, and something about their medicines, besides some information as to their curative methods.

As in every other country at any period, the extraction of carious teeth was in Japan the most common operation for the dentist. The easiest of these cases was usually executed with the thumb and index finger instead of with dental forceps. In case these handy natural tools were ineffective a pair of nippers were used. Sometimes an instrument, similar in its construction to a sickle, only much smaller, was used to loosen a diseased tooth from the gum. This sickle-like tool corresponded to our lancet. After the edge of the gum was cut loose from the tooth, a certain quantity of mercury bichlorid was applied to free the root of the tooth from the gum. Then their ever-ready tools, the thumb and finger, usually did the rest of the work.

Not seldom, a stick and a mallet were used to remove teeth. The stick was made of a hard wood, about six inches long, and one of its ends was finished much finer than the main body. The finer end was firmly applied to a tooth, and then the mallet, which was also made of a hard wood, about twelve inches long, was used to hammer the thicker end of

the stick. These devices—ingenious as they thought—were employed to remove or rather knock out diseased teeth, much to the annoyance and discomfort of the patient. For pyorrhea alveolaris, opium (*konronsan,* "mixed drug") is said to have been used.

Artificial dentures were invented by Bunchu Sato, a famous stomatologist at that time, who had the honor of attending on Princess Fumi, a daughter of the Shogun. The denture made by this pioneer dentist was wholly of wood, carved with a knife or a chisel, so as to take the place of a natural tooth as nearly as possible, on inspection, and it seems to have been intended to restore the natural appearance of the mouth. Meanwhile, teeth were carved from alabaster, white marble, or ivory, and riveted with strong glue to the base of a hard wood with metal pins. These dentures were retained by atmospheric pressure, without providing any special air chamber, independent of natural teeth—this method being invented incidentally. Afterward, a great improvement was accomplished in the making of dentures; they began to be made from a wax impression and a wax model, carving wood blocks by hand and tools, paint aiding in the adaptation. Although these dentures did not serve as well as those now made of india-rubber, yet they were practically attached, and they are known to have served the purpose of mastication tolerably well. Thenceforth they were no longer considered as mere ornaments. Strange to say, the right of making these dentures, during that time, was reserved by the stomatologist, it not being allowed to those outside the profession to make them after his method or even to use them, unless they signed an oath to keep strict secrecy even toward their parents and brothers.

It is beyond possibility to ascertain exactly how far back all of these arts and methods began to be practiced, but, as stated before, since the first part of the Tokugawa dynasty, say about two centuries and a half ago, dentistry was practiced here and there in Japan. These practitioners were for the most part either men of means or *samurai* (knights) who had abandoned knighthood for the profession; and a few of them were respectable physicians who inherited their profession from their ancestors. Among these, Bunchu Sato, the inventor of the artificial denture, and Anchu Shimidzu, once a student of the above, who had also the honor of attending on Unemenosho Toda, the feudal lord of Ogaki, are known to us. Consequently these practitioners were regarded with respect by the public. Afterward, however, men in lower classes, or *ronin* (men expelled from knighthood for their misconduct), who were quite ignorant of everything connected with the treatment of the tooth, came to take up the dental profession. They extracted teeth by force and sold dentifrice in the streets, crying in a curious tone of voice to advertise themselves to passers-by, or attracting people around them by means of a peculiar kind of fencing with a sword four or five feet long, or a skilful art of spinning tops. As a matter of course, their dentistry was a clumsy art; and their dangerous manner of carrying out the operations gradually brought the profession into contempt, and it was no longer considered by the public as a profession worthy of a man of self-respect. Therefore, even at present, the words *iainuki* (the name of a peculiar kind of fencing) and top-spinners make one think of the profession of dentistry; and naturally some suppose that their profession includes the practice of dentistry. Owing to this circumstance, the investigation of all matters connected with dentistry was totally neglected by our countrymen, except some families known as *matsui gensui* (a popular name of top-spinners) and *nagai hiyosuke* (a popular name of peculiar fencers) or their pupils allowed to call themselves by such names.

Such was the condition of dentistry in Japan until the flood of Western civilization poured in as the result of the advent of Commodore Perry of the United States Navy, in 1854. This, of course, brought about a many-sided change in the political, social, and educational institutions of Japan; and, in consequence, the old system of dentistry could not remain un-

affected. The presence of American dentists, the late Dr. Eastlake of Shanghai, and Dr. W. St. George Elliott, of New York at present, both of whom opened their offices in Japan in the beginning of the *Meiji era,* was the first direct cause of the development of our dentistry in the true sense of the word. The former visited Yokohama early in 1868; and after having practiced one year there, he returned to Shanghai. Dr. Eastlake took with him to Shanghai the late Dr. T. Hasegawa, the first Japanese student of modern dentistry and afterward a reputable dentist at Tokio. Dr. Elliott arrived at Yokohama early in 1870, remaining there until late in 1875; and Dr. Y. Obata, who has been practicing at Tokio since 1873, was his first student. Dr. Elliott's five years' stay in Japan gave invaluable benefit to the dental profession by imparting an idea of the modern art of dentistry to some of the old-fashioned practitioners. He imported during his stay a dental engine, tools, and some of the materials, and introduced a primitive dental chair of wood, which was afterward improved and is now generally used by our dentists. From that time, as the years went by, the number of students of the new school gradually increased. Some of them began to practice, and succeeded not only in winning the admiration of the general public by their thoroughness and skill, but also were welcomed by patients of the higher classes whose fathers and forefathers had looked down upon dentists with contempt. Many of our countrymen began gradually to realize the necessity of taking good care of their teeth with competent dentists' aid; and old-fashioned practitioners were entirely abandoned by them, being considered very dangerous and not fit to be relied upon.

It was impracticable, however, at that time to strictly prohibit these old-fashioned dentists from practicing. But, at last, a measure was adopted by the government which had the effect of gradually consigning them to oblivion. This measure was the regulation concerning medical licenses and licensing examinations for both medical and dental practitioners which was promulgated in 1883. This regulation laid down that every dental practitioner must have passed the examinations for a license in dentistry, and the old-fashioned dentists were allowed only to extract diseased teeth and to make artificial dentures, superintended under the by-law published by prefectural offices, according to their local conditions. (See Regulations, given later in this paper.) Though this was not a fatal blow, yet the occupation of these poor practitioners was, henceforth, like Othello's "gone"!

The examinations, thus regulated, consisted of two parts, written and oral. The former comprised six subjects, namely, anatomy, pathology, materia medica, physiology, prosthetic and operative dentistry, the latter being to test the candidates with regard to their practical knowledge as well as their acquaintance with the art of dentistry.

In those days, however, there was no book on dentistry in the Japanese language, neither was there any institution organized for the teaching of that important subject; so that young men who desired to become dental surgeons could find no other means of acquiring the necessary knowledge than by becoming apprentices. None but those who lived at the time and went through the experience can form any idea of the difficulty of attaining a thorough acquaintance with this art without the aid of books and school, and of properly qualifying oneself as a dentist. As a consequence of the conditions mentioned, very few candidates were fortunate enough to get the privilege of practicing; and for the first six or seven years after the date of first examination, the licensed practitioners remained very few in number. (See table, page 1214.)

While the study and the practice of dentistry were in this poor condition, the progress made in all the other departments of medical science in Japan had already become very marked. Large numbers of well-qualified men were enrolled in the medical gazette published by the government, and the educational institutions for medical students were established by the government in the chief towns of the empire. It is needless to re-

mark that the contrast was striking. Unless a more effective plan for the advancement of dental education were laid down by the government, it would of course have been entirely hopeless to bring it up to the level of that of the mother science. Yet the government could not then take any active steps in the matter, being too much occupied with more direct and pressing affairs.

Thus, at that time, the need of an institution designed to promote the specific study of dental surgery was keenly felt. Suggestions looking to the formation of a dental school were heard from time to time, but no definite step was taken. This task was reserved for Dr. K. Takayama, Japan's most renowned dentist. He established a dental school at his own expense in November 1889, at Tokio. The institution was called the Takayama Dental College, being the first school of dentistry ever established in Japan, and the predecessor of the present Tokio Dental College. It was founded with the purpose of educating men to practice dentistry as a specialty of science. The curriculum included the fundamental departments of medicine, with prosthetic and operative dentistry. The courses of instruction, however, were very primitive at its inauguration, owing to the paucity of funds and the deficiency of good instructors. He delivered several lectures himself on dentistry, and he constantly contributed to the school a large amount of money, and his unceasing labor and services brought at last the present development and prosperity of the college (see page 1207). Evidently the result of the organization of the college was important; it led the public to appreciate the importance of dentistry, and put dentists on a higher professional plane than before. Since its establishment, the college has sent out a great many well-qualified practitioners, and it is no exaggeration to say that the college has come to be recognized as the only means calculated to aid those who are desirous of specially qualifying themselves for the practice of dentistry in Japan.

In 1894, another dental school was founded by Dr. K. Watanabe, lately at Nagoya. This school, called the Aichi Dental College, is now existing, yet small in its scale compared with that of Dr. K. Takayama.

Prior to the organization of the Takayama Dental College, Messrs. K. Kanno, Y. Yoshida, and G. Sudzuki are said to have established an apprentice school of dentistry at Tokio, under the superintendence of Mr. S. Kubota, but owing to financial difficulties it d'd not exist later than 1889.

Besides the organization of these educational institutions, an important step toward the investigation of modern dentistry as well as enlightenment as to dental hygiene, was taken in 1890 by some of our dentists establishing an odontological society at Tokio. At that time, the measure was highly appreciated, owing to the fact that almost all dental apprentices were unable to attend the dental school in the daytime, for they had to work from morn to eve in the laboratory of their preceptors. The society of this kind first established was that known as the Shikwa-Kenkiu-Kwai. Its first meeting was held in November 1890. From the time of its organization, meetings held once a month were always crowded by younger practitioners and dental apprentices. They read and discussed their papers, and a monthly magazine, called the *Shikwa-Kenkiu-Kwai-Geppo,* was published. This society, presided over by Dr. S. Yenomoto, has done very much to introduce the American system of modern dentistry among our dental circle, as well as to facilitate the study of apprentices who have no reliable books to aid them. It continued to exist till late in 1900, but unfortunately, with the resignation of President Yenomoto, who, with unceasing labor maintained during his presidency, had brought the career of this society to the highest point, this pioneer institution began to deteriorate, and at last it was dissolved in 1900.

At the same time with the organization of the above society, another institution, called the Shikwa-Kogi-Kwai, was established by Messrs. K. Kanno, S. Yoshida, and G. Sudzuki, dental practitioners of

the old school. The object of this society was to start some lectures on modern dentistry for the apprentices of its members, all of whom were old-fashioned dentists previously referred to. These lectures were printed and distributed among the members. It was natural that old practitioners were refused any social intercourse by the dentists of the new system, and as a matter of course their apprentices wished among themselves to study the new lines of dental science necessary for passing the licensing examinations. Among their lecturers S. Izawa, D.M.D., and Mr. Y. Kojimahara, a translator of American dental books, are said to have incessantly labored for the prosperity of this society, while Dr. K. Takayama taught successfully in his college, which was open to any dental student who desired to be educated.

At that time the failure to restrict the practice of the old-fashioned dentists according to the regulations promulgated in 1883 was a source of constant annoyance to the new dental practitioners. The question of the domain of the license of the former has been discussed eagerly by some dentists, but without any effect. Although prohibited, yet the practitioners of the old system frequently prescribed poisonous medicines for their patients, which caused deaths here and there. This lamentable condition at last caused an association of dental licentiates to be organized in 1893, with the object of carrying out an effective plan for the amelioration of the social position occupied heretofore by the members. It was also the object of the association to protect their profession against the old-fashioned dentists, who occasionally violated the regulations. This organization, the pioneer of professional associations on this line, was named the Shikwa-Ikwai and held its first meeting in June 1894 at Tokio. From that time on, many local associations with the same object were organized throughout the empire. But these associations, which had grown up without any connection between each other, gradually felt the necessity of amalgamating into one body. Thus a new organization of national character sprang up, under the name of the Nihon Shikwa Ikwai (the National Dental Association of Japan), in 1903, and the local associations united are now endeavoring to promote the professional status of dentistry, with a closer uniformity.

Prior to the union of these associations, an odontological society, called Shikwa-Igaku-Kwai, existed, and was attached till the end of last year to the Shikwa-Ikwai; but by the dissolution of its mother association, it was reorganized as an independent society chiefly devoted to the investigation of dental science. At present, the society holds a monthly meeting, in which essays are read, their merits discussed, and the transactions are issued from time to time.

In 1898, the government recognized the necessity of dental education as a department of science—which had been for a long time ignored, in spite of earnest advice given by some of our licentiates—and sent H. Ishiwara, M.D., as assistant professor in the Medical Department of the Imperial University at Tokio, to visit Europe and America with the object of investigating the educational system of dentistry. He came back in 1903, but he was unsuccessful in his ambition to find himself the founder of a dental course in the university, owing to the lack of a government subsidy, and, lately, was obliged to satisfy himself with the opening of a dental infirmary in the university hospital. The writer, therefore, feels quite hopeless of a decisive step to be taken in the near future by our government toward the furtherance of our dental education, and regrets there are no dental courses or departments provided in the universities at Tokio, Kioto, and Fukuoka.

Now to the practical side of this profession. There was another hidden power, probably more direct than those organizations above referred to, in developing both the art and operations of our dentists. I mean the introduction by our graduates of American dental schools of the new methods and discoveries of American dentistry. They have been coming back to Japan, one after another, since 1889. The first graduate was A.

Katayama, D.D.S., formerly an apprentice of Dr. K. Takayama. Soon after his return, he delivered several lectures in the Takayama Dental College. Among these lectures, those on crown and bridge work gave much benefit to the dental profession; but these arts seem to have been more precisely taught by M. Ichinoi, D.D.S. The next phase to be remembered is the return of S. Izawa, D.M.D., to whom we are indebted for an improved method of operation on root-canals, especially in the scientific field. Besides these men, R. Sone, D.D.S., Dr. M. Yamamura, and Dr. H. Matsubara have also done very much since their return to Japan in introducing up-to-date knowledge of operative dentistry. Many graduates recently came back from America, and are all striving to instruct their professional friends in lately advanced system of dental prosthesis. These graduates number nearly twenty, and they are practicing their art with great success at Tokio.

As to those dental practitioners who were once abroad to qualify themselves, it is the writer's duty to specially mention in this essay the names of two preceptors, Dr. Van Denburg and Dr. L. L. Dunbar of San Francisco, both of whom, though they never visited Japan, contributed a great deal to the advancement of dentistry in Japan by training Drs. K. Takayama, A. Katayama, M. Ichinoi, R. Sone, M. Yamamura, and H. Matsubara as first-class practitioners. The former gentleman instructed the first three, the latter the others, in their offices.

During that time, however, many of our practitioners could not rest content without rendering some service in investigating the new line of dental science. Among these, the writer recollects Drs. S. Yenomoto and S. Tomiyasu on cataphoresis and Drs. S. Tomiyasu and K. Ogawa on oral bacteriology. The latter two have been incessantly studying the oral microbes since 1888.

Before closing this essay, a few considerations on the methods of practice of our practitioners may be briefly stated, that we may appreciate fully their present standing. Twenty years ago the chief materials used in filling teeth were amalgam and gutta-percha, the roots of the teeth being filled with cotton saturated in creasote or carbolic acid; but at present, with the improved methods of root-canal operation, these materials are rarely used as temporary fillings. The gold foils made in Japan are so excellent in their quality that cohesiveness can be altered easily by heat or ammonia. Since 1889, crown and bridge work has been introduced, and this art is now very familiar to first-class practitioners of our country. To a great extent, however, vulcanized artificial dentures, with clasps or without, are welcomed by the majority of our patients, who are unable to pay so much fee as is demanded for the former operation. For the same reason, continuous-gum work is rarely met in practice. General anesthesia is as yet quite unknown to our dentists, owing to the fact that their patients never seek to escape suffering by such means. Between 1888 and 1890, cataphoresis was highly recommended by some practitioners, but the result being unsatisfactory we find at present no apparatus of this process in any dental office. Thus the local anesthetic agent now in vogue is a mixed dose of cocain and adrenalin, and some recommend the Schleich local anesthesia. Recently, porcelain inlay work is attracting much attention. As to antiseptic arrangements, our practitioners are always paying great attention to it. It is to be attributed to the fact that our physicians have appreciated to a considerable extent the importance of asepsis; and dentists could not alone remain indifferent. The sterilizing agents now generally used are carbolic acid and formaldehyd. Many convenient sterilizing apparatus have been invented, and at least one of them is recognized as indispensable in a dental office.

Concerning the dental specialties, Japanese manufacturers have recently made rapid progress, and dealers carry a fairly good line of goods, many of them being imported and many now being made by themselves. Yet, with few exceptions, wooden chairs of old style, very clumsy

in form, are seen in most operating rooms. Some time ago, a few chairs were made on the same pattern as American dentists', but being liable to get out of order, our first-class operator now prefers the Wilkerson chair, and up to the present nearly one hundred of these chairs have been imported. Electric or hydraulic dental engines have not yet been imported. Foot-power dental engines are generally in use, most of them being made in our country and are practically serviceable, except their sheaths. Almost all the instruments, such as drills, excavators, nerve-broaches, forceps, etc., are also made in Japan; the faults once common in most of them are no longer met, and their use is increasing day by day. Electric appliances of all kinds made in Japan are excellent and compare with those made in America or Europe. They are clumsy in form, but not different at all in their effect. The manufacture of artificial teeth is still in a very primitive stage of evolution. Most teeth for rubber work are pinless—platinum being too expensive—having an undercut for the retention of rubber. Lately, Dr. R. Watanabe made teeth with metal pins, infusible like the platinum pin and applicable to any metal base; but they are made only for his own use.

All in all, however, the Japanese manufacturers are still in the most immature state of development, and it is no exaggeration to say that to a large extent American firms are supplying at present dental goods, especially up-to-date appliances, for Japan.

Thus far the writer has given only a short sketch of the past and present of dentistry in Japan. Undoubtedly every reader will recognize the fairly rapid progress it has made during the past thirty years. But no one could possibly disagree with the writer in saying that it is still in a primitive state of development. There are altogether 766 dentists in the empire, some of whom were barely licensed in virtue of doubtful knowledge acquired as apprentices. Granting that all of them are capable of attending to the teeth of the nation, we must remember that Japan has fifty million inhabitants. This means only one dentist for every 65,274 persons. No wonder that so many Japanese suffer from caries, and consequently from dyspepsia. It need not be said that the present slow state of progress is far from what we can be satisfied to tolerate. Reviewing all the conditions, we realize most conscientiously that the mission of the present dental practitioner is very great, and we are sincerely hoping that the time shall speedily come when we shall be able to turn out the necessary number of dental licentiates, so that they may better meet the demand of the field before us, which is already white.

II. Dental Schools.

Tokio Dental College.

The Tokio Dental College, the oldest institution of dental education in Japan, was established at Tokio in November 1889, by Dr. K. Takayama. The institution was called at that time the Takayama Dental College, after its founder. The aim of the college is to furnish dentists and those desiring to engage in dentistry with every opportunity of acquiring a thorough practical education in that science.

At the first session of the college the faculty was composed of seven instructors, the majority of whom were former apprentices of the founder, and who were all reputable practicing dentists at that time. The chair of the president was occupied by the founder. In the beginning of the first session, only nine students were enrolled, but the number was increased to forty-five in July of the next year. From the inauguration of the college, financial difficulties were very considerable; consequently a certain sum of money was contributed by the founder to make good the deficit. The courses of instruction at that time were very primitive, owing to the paucity of the fund, and all the students were instructed in one classroom. The course consisted of instruction in physics, chemistry, anat-

omy, pathology, physiology, materia medica, operative and prosthetic dentistry, and clinical lectures were given twice a week. There being no text-book, it was a matter of pressing importance to provide them, so as to facilitate the investigation of the students. After incessant labor of four years, from 1891 to 1895, text-books on dental metallurgy, operative dentistry, prosthetic dentistry, dental surgery, materia medica, and anatomy of the fifth nerve were written by the professors, and published by the college year after year. Besides these works, notes of lectures delivered in the class room were also published monthly for the convenience of outside students who could not attend the college regularly. In January 1900, Dr. Takayama was obliged to place the college under the control of Dr. M. Chiwaki, one of the faculty, being himself too busy with his practice to look after the business of the institution. Dr. M. Chiwaki then took upon himself the sole responsibility of the college. He removed the institution to the present building at Misakicho, Kanda, which was bought at his own expense. In the beginning of the annual session Dr. Takayama resigned, and the presidental chair was given to Dr. M. Chiwaki as his successor. After the removal of the college to this location its name was changed to that which it now bears, and improvements were made in the schedule and in the system of instruction so as to bring them up to the level of modern requirements and of the present standing of dentistry in Japan. Thus the courses of instruction were extended over three collegiate years, and some able professors were added to the college staff. Owing to these innovations, the prosperity of the college was considerably increased and the faculty have steadily carried out further improvements, their object being to secure a more thorough scientific training of the students. In addition to those facilities, the recent advancement of dental science in America necessitating the publication of new text-books in lieu of those hitherto used, the college has published more full and up-to-date works, written by the professors during last session. The subjects of these text-books are—Dental anatomy and histology, dental pathology, orthodontia, operative dentistry, prosthetic dentistry, materia medica, crown and bridge work, and oral bacteriology.

Since its establishment the college has sent out 138 graduates, and nearly four hundred students have passed the licensing examinations. These qualified dentists constitute over one-half of all the practitioners who have so far qualified themselves in Japan. The college therefore is recognized as the only means calculated to aid those who desire specially to qualify themselves for the licensing examinations.

The course of instruction of the college extends over three years of ten months each. Information is imparted by lectures, recitations, clinics, and practical exercises with the aid of text-books appointed by the faculty. Schedule:

Freshman — Chemistry and physics, physiology, anatomy (general and dental), materia medica.

Junior—Dental metallurgy, therapeutics, general pathology, bacteriology, operative and prosthetic dentistry, laboratory work, infirmary practice.

Senior—Surgery, bacteriology, operative and prosthetic dentistry, crown and bridge work, laboratory work, infirmary practice.

All candidates for admission are to present a satisfactory evidence of moral character, and are required to pass a preliminary examination or to present a certificate of graduation from a middle school, or a first-class certificate covering the subjects enumerated: (1) History, universal and Japanese; (2) Elementary physics and chemistry; (3) Rhetoric, Japanese and English; (4) Arithmetic; (5) Algebra; (6) Geometry.

Candidates for advanced standing are admitted upon the following conditions:

(1) Candidates for the junior class are to present a freshman class certificate of a medical school, or to pass final examination of freshman class of the college.

(2) Candidates for the senior class

are to present the above-mentioned certificate, and are required to be properly certified by a reputable practicing dentist, or to pass final examination of junior class of this college.

For graduation, every candidate is required to devote three years to the study of dentistry, including his collegiate course, or to have attended three full courses of lectures in separate years which must have been in this college. At the end of the third year, a student who has satisfactorily passed the final examination of this college receives a diploma. At present the college does not confer a degree.

Aichi Dental College.

The Aichi Dental College, one of the two institutions of this kind now in existence, was established at Nagoya in August 1894, by K. Watanabe, D.D.S., at his own expense. The object of the college is to furnish a complete course of instruction in the theory and practice of dentistry. The first president of the college was Dr. J. Ito. In 1898, the institution was removed to the new building at Sasajimacho, Nagoya, specially designed for that purpose. Since that time, the presidential chair has been occupied by K. Watanabe, D.D.S., the founder of the college. The number of the students at present is fourteen. The college has sent out twelve graduates and twelve licentiates since its establishment.

The courses of instruction of this college consist of the preliminary course (two years) and the dental course (two years and a half). The schedule of studies consists of the following:

Preliminary Course—Physics, chemistry, anatomy, histology, physiology, and embryology.

Dental Course—Dental anatomy, dental histology, dental pathology, materia medica, prosthetic and operative dentistry, and infirmary practice.

Candidates for admission are required to present evidence of good moral character, and to pass an examination for admission to each course respectively.

As to the present status of the college, the writer has failed to get any information.

III. Dental Publications.

(1) *Books.*

Since 1885, a large number of dental books have been written and many translations have been made by our licentiates, of which the writer has compiled the accompanying table.

Published.	Translators or Authors.	Titles.
1885	K. Otsuki	Shikwa Zensho.
1887	S. Izawa	Shikwa Mondo.
1889	Y. Kojimahara	Shikwa Teiyo.
1890	Y. Kojimahara	Shikwa Shogi.
1890	K. Takayama	Yeisei Hoshi Mondo.
1890	K. Takayama	Hoshi Shinron.
1890	R. Watanabe	Shikwagaku, Vol I.
1891	Y. Kojimahara	Shikwa Byori Kakuron.
1891	K. Takayama	Gotsui Shinkei Kaibohen.
1892	K. Takayama	Shikwa Shujitsu-ron
1892	K. Takayama	Shikwa Kikaigaku.
1892	K. Takayama	Shikwa Hanron.
1892	Y. Kojimahara	Shikwa Seirigaku.
1893	K. Takayama	Shikwa Yakubutsu.
1894	Y. Koidsumi	Shikwa Zairiogaku.
1895	K. Takayama	Shikwa Yakubutsugaku.
1897	N. Takahashi	Shikwa Byorigaku, Vols. I, II.
1897	M. Araki	Kammei Shikwa Shujitsu gaku.
1897	M. Araki	Basshishi-jutsu.
1897	M. Araki	Insho Saitokuho.
1901-02	N. Takahashi	Shikwa Byori Shinron, Vols. I, II.

Besides these books, the Takayama Dental College published monthly during 1890-92, notes of lectures given by its professors in the form of a magazine. This magazine, entitled the *Takayama Shikwa Igakuin Kogiroku* was circulated among the outside students who could not attend college regularly. It consists of twenty-four volumes, each containing at least one hundred pages on several subjects of dentistry; but these volumes are now scarce.

The most important foreign works consulted in writing the books above listed are : "Garretson's Oral Surgery"; "Parreidt's Compendium of Dentistry"; "Abbott's Dental Pathology"; "Fillebrown's Operative Dentistry"; "Webb's Operative Dentistry"; "Metallurgy and Dental Jurisprudence from American System of Dentistry"; "Essig's Dental Metallurgy"; "Richardson's Mechanical Dentistry"; "Gorgas' Materia Medica"; "Rymer's Dental Anatomy"; "Harris' Principles and Practice of Oral Surgery," etc.

While the works above referred to include almost all the necessary subjects of dentistry, the recent advancement of dental science in America necessitated the publication of new text-books in lieu of those hitherto used; and the writer edited the following complete and up-to-date works, written each by the professors of the Tokio Dental College, after incessant labor for five years, specially taking care to avoid contradiction in their contents as well as their theories (Text-books of Dentistry, edited by Drs. M. Chiwaki and T. Okumura): (1) "Dental Anatomy and Histology," by Dr. T. Okumura; (2) "Dental Pathology," by Dr. T. Okumura; (3) "Orthodontia," by Dr. M. Chiwaki and K. Sato, D.D.S., M.D.; (4) "Operative Dentistry," by Dr. M. Chiwaki; (5) "Prosthetic Dentistry," by Drs. H. Uriu and T. Okumura; (6) "Dental Materia Medica," by Dr. U. Hayakawa; (7) "Crown and Bridge Work," by Drs. T. Fujishima and T. Okumura; (8) "Oral Bacteriology," by Drs. K. Nakagi and K. Ogawa.

These works are recognized at present as the standard works of dentistry. In writing these works, the authors in respect to theories and methods referred chiefly to the contents of the following books now used in American dental colleges: "Kirk's Operative Dentistry"; "Essig's Prosthetic Dentistry"; "Eckley's Anatomy of the Head and Neck"; "Gray's Anatomy"; "Miller's Micro-Organism of Human Mouth"; "Sewill's Dental Surgery"; "Black's Descriptive Anatomy of the Human Teeth"; "Bödecker's Anatomy and Pathology of the Teeth"; "Hopewell-Smith's Dental Microscopy"; "Burchard's Dental Pathology and Therapeutics"; "George Evans' Artificial Crown- and Bridge-Work"; "Guilford's Orthodontia"; "Angle's Malocclusion of the Teeth and Fracture of the Maxillæ"; "Fillebrown's Operative Dentistry"; "Gorgas' Dental Medicine"; "Broomell's Anatomy and Histology of Human Mouth and Teeth"; "Harris' Principles and Practice of Dentistry"; "Litch's American System of Dentistry"; "Johnson's Principles and Practice of Filling Teeth"; "Talbot's Interstitial Gingivitis"; "Cryer's Internal Anatomy of the Face"; DENTAL COSMOS, dental reviews, etc.

(2) *Periodicals.*

The periodicals in our language, directly referred to dentistry, published heretofore are—

(1) *Shikwa Kenkiukwai Geppo,* a monthly transactions of Shikwa Kenkiukwai, an odontological society, presided over by Dr. S. Yenomoto. First issue, January 1891; last issue, No. 132, 1900.

(2) *Shikwa Zasshi,* a journal of dentistry, an advertising medium of Messrs. Midzuhoya's Dental Depot, having some translations of foreign dental journals. First issue, September, 1891. Date of publication irregular.

(3) *Shikwa Kensan,* a dental journal edited by Dr. S. Tomiyasu, chiefly devoted to the investigation of oral bacteriology. First issue, April 1898. Date of publication irregular. The last issue (No. 23) June 1904.

(4) *Shikwa Kokiu Iho,* Dr. S. Izawa's

report of the progress of dental science. Date of publication irregular. Ten volumes have been published.

(5) *Shikwa Gakuho,* previously entitled *Shikwa Igaku Sodan,* a monthly record of dental science, oral surgery, and medical miscellany in the interests of the alumni of the Tokio Dental College, edited by Dr. M. Chiwaki. First issue, October 1885. The last issue (vol. ix, No. 7) July 1904.

Among these publications, the last one is published punctually at present. Since its first issue, the journal is said to have had an unrivaled circulation of two thousand copies, distributed monthly to the alumni of the Tokio Dental College and its subscribers, as well as to many dentists and physicians throughout the empire, and it is now recognized as a leading journal of dentistry in the Orient.

IV. Dental Associations.

As previously referred to in the first part of this paper, the pioneer association of dental practitioners, called the Shikwa Ikwai, was organized at Tokio, in 1893, and since that time many local associations with the same object have been established, from time to time, without any connection between them. These associations, however, moved by the necessity of carrying out their plans with closer uniformity, were united into one body of a national character in 1903. The National Dental Association of Japan, thus organized, was entitled the Nihon Shikwa Ikwai and is now doing its best to strengthen the unity of the dental profession throughout the empire.

The object of this association is to ameliorate the status of dental practitioners as well as to protect their profession. The membership consists of dental practitioners who have the licensing certificates of the Japanese government. The committee of the association is composed of one president, one vice-president, and an executive committee of three, all elected by votes of delegates who represent the local associations organized by the members. All the committee hold their offices for one year. A general meeting of all the members is held once in three years to carry out the plans of the association, and the delegates, presided over by the president, meet annually for the transaction of business. The executive committee are informed of the Regulations or orders as well as of necessary affairs closely connected with dentistry, and their duty is to furnish the information above mentioned to all the members of the association. The present committee are as follows: K. Takayama, president; S. Yenomoto, vice-president; Executive Committee—M. Chiwaki, K. Sato, R. Sone.

At the same time with the organization of the above association a society chiefly devoted to the advancement of dental science was organized by the members of the Shikwa Igaku Kwai, the predecessor of this society, and belonged to the Shikwa-Ikwai till the end of last year, when it was dissolved by the union of its mother association. The new scientific society—that is, the Nihon Shikwa Igaku Kwai, the Odontological Society of Japan—meets monthly. The membership consists of dental licentiates, and one president, one vice-president, and five on the executive committee constitute the officers of the society. The members of the executive committee are elected by the members, and they hold their office for one year. Besides these officers, thirty members are nominated by the president as the councilors of the society, their term of office being one year. The officers are as follows: S. Izawa, president; S. Tomiyasu, vice-president; Executive Committee—T. Fujishima, D. Tsukahara, N. Takahashi, K. Ogawa, and T. Okumura.

V. Dental Legislation.

(1) *Regulations relating to the License of Medical Practitioners.*

Published by Notification No. 35 of October 23, 1883, and enforced from January of the next year.

Article I. Physicians must pass the examinations for practicing medicine, and must hold a license from the Home Minister. The

licenses obtained before the enforcement of these regulations may continue effective.

ART. II. Those persons who desire to obtain a license for practicing medicine shall forward a request to the Home Department through the local government, with a diploma proving that they have passed the examinations for the practice of medicine.

ART. III. When the graduates of the government and local medical schools desire to obtain a license for practicing medicine, upon presentation of the diploma given at these schools, the Home Department may grant licenses without requiring further examinations.

ART. IV. When those persons who have graduated from medical colleges or schools in foreign countries, or those who had licenses for practicing medicine in foreign countries, desire to obtain a license for practicing medicine, upon the presentation of their diplomas or licenses, the Home Minister may grant licenses to them without any examination, after having carefully inspected the foreign diplomas or licenses.

ART. V. In remote and out-of-the-way places where physicians are very scarce, temporary licenses may be granted to persons without examinations, in consideration of their experience in practicing medicine, but only with the approval of the local governor.

ART. VI. Persons who desire to obtain the licenses for practicing medicine, shall pay each a fee of twenty yen at the time when they receive them.

ART. VII. The names of physicians to whom the medical licenses have been granted, shall be registered in the list of physicians of the Home Department, and shall be published occasionally.

ART. VIII. Any physicians who desire to obtain new licenses on account of having damaged or lost their previous licenses, or of having changed their names or provinces, shall make application to the Home Department through the local government, stating the reasons for such application.

ART. IX. Those who desire to exchange their license for a new one, shall pay a fee of one yen at the time when they receive the same.

ART. X. The medical licenses of those physicians who have died or have given up their profession shall be returned to the Home Department through the local government.

ART. XI. If any physician commits a crime or any fraudulent act in connection with his profession, the Home Minister, acting on the decision of the Central Board of Health, may suspend him from practicing. Even when such a crime or fraudulent act has been committed before the license was granted, he shall be treated according to this article.

ART. XII. When any physician is forbidden to practice medicine according to the preceding article, the local government shall confiscate the license and return it to the Home Department. When any physician is temporarily suspended from practicing medicine, the term of suspension must be indorsed and sealed on his license by the local government, and the license shall be given back to him.

ART. XIII. After such a physician has been suspended from the practice of medicine, the Home Department shall keep a careful watch over his future conduct, and after the decision of the Central Board of Health, special arrangement may be made in order to restore him to his profession.

(N. B.—In the above regulations, the term "physician" includes dental practitioner.)

When the above regulations were enacted, the regulations concerning the examinations for the practice of medicine as well as dentistry were promulgated as follows, and the same were enforced from January 1884:

(2) *Regulations with regard to the Examination for the Practice of Medicine.*

ARTICLE I. All persons who desire to practice medicine shall pass examinations according to the regulations.

ART. II. The examinations will be held twice a year under the direction of the Educational Minister, and the time and place shall be notified previously by the same minister.

ART. III and ART. IV annulled.

ART. V. The examinations shall be two in number: a preliminary examination and a final examination; and no one shall be allowed to take both examinations at the same time; provided that only one examination is sufficient on dentistry.

ART. VI. The subjects of the examinations shall be as follows:

For physicians: *Preliminary examination*—(1) Physics; (2) Chemistry; (3) Anatomy; (4) Physiology. *Final examination*—(1) Surgery; (2) Medicine; (3) Materia Medica; (4) Ophthalmology; (5) Obstetrics; (6) Clinical Operations. *For dentists*—(1) Dental Anatomy and Physiology; (2) Dental Pathology and Operative Dentistry; (3) Dental Materia Medica; (4) Prosthetic Dentistry; (5) Clinical Operations.

ART. VIII. For each of the preliminary and the final examinations, a course of study of at least one year and a half is required; provided that a course of no less than two years' study is required for dentistry.

ART. IX. Candidates for the preliminary examination must present an application and also state the course of their studies; and candidates for the final examination, an ap-

plication with the course of their studies and a diploma stating that the preliminary examination had been satisfactory. Such applications, with the required documents, must be presented to the local government during January or July. The local government will receive these applications and other documents before the fifteenth day of the following month, when they shall be sent to the Educational Minister. To the candidates' applications, the signatures of their preceptors or of not less than two physicians are required to be appended.

ART. X. When applicants for examinations commit a crime or any fraudulent act in connection with the medical profession, the local government shall make a report of the same to the Educational Department. In such cases, the said department may suspend them for a certain term from taking examinations according to the decision of the Central Board of Health in regard to their misconduct.

ART. XI. Questions for the examinations shall be selected by a consultation between the chairman and the members of the examining board; at the examination places, the applicants must answer the question in writing; provided that oral answers may be occasionally allowed.

ART. XII. Annulled.

ART. XIII. Candidates who fail in the examinations cannot be allowed to be examined again until six months have elapsed.

ART. XIV. The following fees must be paid by the candidates at the time when they present their applications; provided that no fees shall be returned when once paid: 5½ yen for the preliminary examination; 9 yen for the final examination, and 9 yen for the examination of dental practitioners.

ART. XV. Annulled.

In 1898, the following orders were published and enforced:

(3) *Order No. 2 of the Home Department, dated February 5, 1898.*

To those candidates who have passed the theoretical part of the final examination for the practice of medicine, and to those who have passed the theoretical part of the examination in dentistry may be given diplomas certifying that they have been successful in the examinations.

Candidates who obtain the diplomas above mentioned may receive the practical part, *i.e.* clinical operation only, of the final examination.

Candidates for the practical part of the final examination shall present an application with a diploma given by the chairman of the examining board, proving that the theoretical parts have been successfully passed, provided that 6 yen must be paid as fee for the examination.

Combined with the enforcement of these regulations, it could not be left without a measure to supervise the practice of old-fashioned dentists, who were allowed only to extract diseased teeth and to make artificial dentures. Henceforth, local governments each enacted several orders on the matter according to their local conditions, of which the following rules enforced at Tokio since 1884 are typical and worthy to be referred to. They were published by the Tokio Municipal Office—Order No. 58 of 1884:

(4) *Rules relating to the Supervision of Makers of Artificial Dentures, Tooth-Extractors, and Bone-Setters.*

ARTICLE I. Makers of artificial dentures, tooth-extractors, and bone-setters, who have heretofore obtained licenses for their practice, shall be required hereafter to hang their tablets, on which the names, professions, and addresses are precisely written, in the shop fronts, provided that they must not use any tablets resembling those of physicians or dentists.

ART. II. Those practitioners above mentioned, who desire to open a branch office, must previously forward a request to the Tokio Municipal Office, stating their addresses and office hours.

ART. III. Poisonous medicines listed in Order No. 2 of the Home Department are strictly forbidden to be used by those practitioners above mentioned.

ART. IV. When those practitioners go out to visit their patients, they must take with them their license tickets; and they are strictly prohibited from lending the tickets to others.

ART. V. The license tickets of those practitioners who have died or have given up their practice or removed their offices to other districts of the Tokio Municipality, shall be returned to the Tokio Municipal Office.

ART. VI. Those practitioners who desire to obtain new license tickets on account of having damaged or lost their previous ones, or of having changed their names or addresses, shall make application to the Tokio Municipal Office, stating the reasons for such applications.

ART. VII. If any practitioners above mentioned violate these rules, they shall be liable to confinement in a police station of not less than two days but not exceeding five days, or to a penalty of not less than 50 sen, but not exceeding 1½ yen.

(5) *Dental Examinations.*

In our country, at present, there is no special board of dental examiners, but the purpose of the regulations is carried out by some members of the medical examining board, appointed specially by the Minister of Education from among practitioners of acknowledged ability, to examine the candidates for dental licentiate. These examiners are included at large under the name of medical examiners, and they are presided over by the chairman of the said committee. The qualification of these members is quite unknown. Their office is unfixed, and their number also unlimited. Questions for the examinations are selected by a consultation of these members, each forwarding a few questions on the subjects for which he has responsibility to examine their papers; and clinical operations are performed, at Tokio, in the presence of at least two members, each asking two or three questions on operative dentistry as well as prosthesis, on a patient presented. At present, theoretical or written examinations are held at the same time in every town of the empire where the local government is seated, and their questions are the same throughout the country. This board of dental examiners at present consists of three members: M. Ichinoi, D.D.S., S. Izawa, D.M.D., and H. Ishihara, M.D., presided over by Dr. H. Adachi, the chairman of the medical examining board.

VI. Number of Dental Licentiates.

Prior to the promulgation of the regulations concerning medical licenses and licensing examinations for both medical and dental practitioners, in 1883, nineteen dentists were recognized by the evidence of many years' experience or of their practice in foreign countries. These licentiates, at that time, were enrolled in the medical gazette of the Home Department with the same certificates as physicians. Among these we find Drs. Y. Obata, K. Takayama, S. Nishimura, well-known professional men of the present time.

Year.	Number of Practitioners licensed.	Year.	Number of Practitioners licensed.
1884	2	1894	42
1885	12	1895	39
1886	22	1896	38
1887	14	1897	48
1888	23	1898	98
1889	30	1899	54
1890	27	1900	42
1891	27	1901	51
1892	28	1902	73
1893	31	1903	74

The foregoing table shows the number of dental licentiates since the enforcement of the regulations.

The total number of dental practitioners at the end of 1903, including those licensed prior to 1883, is 766.

THE USE OF THE BLUE LIGHT IN THE REDUCTION OF SWELLING AND THE ALLEVIATION OF PAIN.

By J. C. WATKINS, A.B., LL.B., D.D.S., Winston Salem, N. C.

ABOUT a year ago my attention was called to a clipping from a newspaper, the substance of which was that a surgeon in Paris claimed that by the aid of certain rays of light he had been enabled to produce anesthesia to such an extent that he could perform minor operations without the patient experiencing any pain. I must confess that I did not have a great degree of confidence in what I read, nevertheless I decided to give these rays a trial, and began a series of experiments, the results of which, much to my surprise, have been very satisfactory, inasmuch as they were most successful.

It is the "Blue Light" that I wish to bring to your attention—not for the extraction of teeth, as has been mentioned in some of our journals for the last few months, but for "the reduction of swelling and the alleviation of pain." Those who have used the blue light have done so by subjecting the patient to a bath of blue light in a dark room, and these rays, they claim, exert an influence upon the brain through the optic nerve, while perhaps the element hypnosis enters slightly. The system that I wish to introduce is so simple that we all can at once incorporate it in our practice. It is simply to apply the blue rays directly to the part affected.

I will describe the appliance that I have constructed. It is simply a sixteen-candle-power blue electric-light globe arranged in a funnel-shaped tin shield which at its mouth is about four inches in diameter. This is extended about four inches, and has at its end a ground blue glass and convex lens. The ground blue glass is used to disseminate the blue rays so that the patient may not know the simplicity of the apparatus, and I attribute no especial virtue to the lens. I have kept a clinical history of a number of cases, and will simply indicate several different classes where I have used the light to advantage.

Class I. In "abscessing teeth," where the tooth is "long" and the patient cannot endure touching the tooth, I have made a simple opening, and then with the blue light had the tooth perfectly easy in a few minutes. But in a number of recent cases where I could not have opened the tooth, because it was so very sore, I have with the "blue light" eased the pain and thus been enabled to open into the pulp-chamber without hurting the patient.

Class II. After inserting Richmond, Logan, or shell crowns, where the patient is experiencing excruciating pain, the "blue light" will in a few minutes have the pain entirely subdued.

Class III. In the severe throbbing pain following the extraction of an "abscessing tooth," the blue light will bring relief in five minutes.

Class IV. Last week a man came to my office suffering greatly, saying that he had been unable to sleep during the previous night and was very anxious to get relief. I found that the right superior second bicuspid was causing the trouble. There was a snugly-fitting shell crown, extending over a line under the gum, on the tooth. The gums were inflamed, and there was great soreness of the parts adjoining the tooth, which was loose. Upon inquiry I found that the root, which had been badly diseased, had been built up with amalgam around a screw-post. This had been done over fifteen months, during which time the tooth had been perfectly comfortable. With the patient thus suffering, I ap-

plied my blue light, and in a few minutes pain had subsided, but the patient experienced a feeling of fear lest the pain should recur. I sent him back to his own dentist, and on the following morning he phoned me that his tooth had given him no trouble, was much tighter, and there was only a little soreness.

A little girl came to me with the roots of the left upper first molar "abscessing." The roots were nearly covered with overlapping gum, and her face was very much swollen, so much so that you could hardly see her left eye, as she could not open it. There was also throbbing pain. The light was applied, and in about twenty minutes the swelling was greatly reduced, she could open the left eye about as wide as the right, and the pain had subsided. I then extracted the roots, which did not seem to cause much discomfort.

Class V. I will mention only one more class of cases, and that is impacted third molars; and here the "light" has proved my best friend. The most remarkable case I have had was that of a man twenty-eight years of age, whose left lower third molar was his "thorn in the flesh." The anterior cusps showed, and the others were covered. I cauterized the overlapping gum one afternoon with carbolic acid; similar treatment was given the next morning. He continued to get worse until eleven o'clock, when he had to leave his business and go home. At four o'clock his face, tonsils, and throat were swollen, he could scarcely open his mouth wide enough for one to insert the fingers between his teeth, and the pain was intense. The light was used about twenty minutes, and *gave relief.* He could open his mouth with comfort, the swelling was so nearly gone that one could not notice it, and he felt very little soreness in his throat and mouth—not enough to mention. The next morning there was a slight soreness, while on the following day he was entirely well.

I realize that many members of our profession will think I am very enthusiastic over my "blue light," but I ask you to give it a fair trial, and I am sure that in many cases—cases where you scarcely know what to do—you will give ease and comfort to your patient, and experience great satisfaction yourself.

CORRESPONDENCE.

"HISTORIC DOUBTS" AS TO DR. LEDYARD SMITH'S ANCIENT MEXICAN SKULLS.

To the Editor of the Dental Cosmos:

Dear Sir,—I read in the Dental Cosmos for July ultimo a communication from Dr. Ledyard Smith of New York, in which he declares that he possesses five skulls of ancient Mexicans, and that in none of them are complete the four third molars. He believes that the said skulls are genuine because he obtained them from a "peon with a liking for grave-digging," and because the skulls are perforated by spear-heads, copper nails, and obsidian stone.

I will answer this communication because I do not want the readers of the Cosmos to remain under the impression of such erroneous and false ideas as those expressed by Dr. Ledyard Smith.

As a matter of fact let me say that the Mexican Indians never used copper nails, nor killed their enemies by perforating their craniums. It is no wonder, then, that the skulls in Dr. Smith's possession should not have the third molars complete —as the skulls do not belong to the old Mexican races!

I have examined *all* the skulls in our National Museum, and have not been able to find the smallest trace of wounds made with either obsidian stone or copper in any of the many which are kept there.

I am positive that Dr. Smith has been

victimized by the class of people of this city who falsify idols and other things in order to sell them to foreigners, whose good faith they abuse. And so it must be, because if the government with all its resources has not been able to find *one single skull,* how could a stranger possibly own five?

I take pleasure in remitting herewith two original letters and their translation, from our first authorities in this matter; they will destroy all doubts about this subject. The one is from Dr. Leon, professor of anthropology and ethnography; the other from Prof. Gonzalez Obregon, who has dedicated all his life to the study of Mexican history. Both are actually professors of our National Museum, and they are considered in this country as the most learned in the matter.

I remain, dear sir,

Very respectfully yours,

J. FALERO.

TACUBA 18, MEXICO, D. F.,
August 16, 1905.

From Dr. Leon.

DR. J. FALERO:

Dear Sir and distinguished Friend,—The contents of your favor dated yesterday noted, and after consideration of the paragraphs which you point to me as taken from a study presented by Dr. F. Ledyard Smith, of New York, entitled "The Disappearance of the Third Molar," I proceed to submit to you what I know in regard to the matter.

Neither in the primitive national and foreign chroniclers, nor in the extensive collection of craniums owned by this museum, as neither through none of the explorations undertaken by me personally, is there any mention made or any Indian skulls demonstrating an ante-Columbian custom having any analogy with the fact proffered by the said writer.

I do not doubt as to the authenticity of *breed,* or the ante-Spanish epoch of the cranium, for it is a known fact that the manufacturers of adobes (mud bricks) are daily discovering in their grounds, or in the suburbs of the City of Mexico, craniums of this species.

There was a time when the sale of these craniums produced for them a regular income, but little by little the profits derived thereby proved insignificant. It was then that they resorted to the means of making them interesting, by engraving on them some hieroglyphs more or less analogous to the original ones; mutilating the teeth, perforating them, or even placing into their cavity fragments of obsidian stone, pyrites of iron and copper, and even genuine emerald.

This industry having likewise proved a failure, it was then that it fell into the hands of less illustrious parties. At this time there began to appear perforated craniums containing in the perforations copper nails, arrow-points of obsidian stone or flint, and even some small axes of that same metal. It is clear that the object was to secure the oxidation of said metal, in order to produce the desired hue.

Until such time things were going on middling, when other industrials made their appearance, and these were not satisfied with piercing a hole through the cranium and placing therein one nail only, but mixed with points of obsidian stone and flint they would introduce six, eight, and even up to ten of those. The primitive skulls thus obtained were claimed to proceed from victims of war or its subsequents, or that they emanated from some chastised misdoers, or from offerings to the divinities, sacrified in such a manner in compliance with the rituals.

Whenever you are at leisure we will together take a walk around the suburbs of this city, and call at one of the manufacturers of those remarkable mock antiquities.

Briefly, dear friend, I believe that Dr. Smith possesses a tacked skull, one of those of the kind just described.

Regarding the question concerning the third molar, something could be stated, but neither do you ask me any question on the subject nor have I time disposable for telling you about what I have investigated in the matter, although my investigations bear upon certain —or other—Indian tribes.

The information of Dr. Smith will not accelerate nor retrograde Mexican ethnology; it may incidentally preoccupy the mind of some inexperienced amateurs, but by no means that of serious and judicious scholars. These are accustomed to seeing with both the two eyes, and not with only one, and they look forth for something more than the testimony of a poor day's-worker or that of a vender of mock antiquities; that which in the actual case is alike when such a noteworthy ethnical novelty is offered to them.

How many tricks have I not witnessed and heard of, which have been served to our cousins! Mexico, Puebla, and Oaxaca have real manufacturers of antiquities, and some of their products are so neatly executed that

even some professors have fallen in the net. For this very reason I can excuse Dr. Smith.

With the wishes of having been of service to you, I remain

Your obedient servant and friend,

(Signed) N. Leon,
Dep't Anthropology and Ethnography.

National Museum, Mexico, D. F.,
August 10, 1905.

From Professor Obregon.

Dr. J. Falero:

Esteemed Sir and distinguished Friend,—In answer to your favor dated yesterday, it is satisfactory to me to express the following:

First. That no chronicles or histories whatsoever that I have read give any statement as to the old Mexicans having applied torture to their foes by perforating their skulls with copper nails or obsidian stone.

Second. That I have carefully examined the numerous skulls existing in our National Museum, and have not found a single one bearing signs of such perforations.

Third. Yes, the old Mexicans made use of copper, manufacturing out of it some agricultural implements, axes, hawks-bills, needles, some kind of T; the latter, according to certain statements, were employed by them instead of coins, but never among these, or those utensils of said metal, have I seen that they made copper nails.

Fourth. That not only it is probable, but most assuredly, Dr. Smith has been foully dealt with regarding the skulls which he has acquired; for it is long since that a certain class of people are speculating with the foreigners traveling through or visiting in our country, selling them false antiquities and craniums proceeding from Europe. There being a great demand of the same, and great difficulty in finding them from indigenous sources and antique, the dealers are exhuming the aforesaid skulls from modern sepulchres.

I avail myself of the opportunity for renewing to you the offer of my services, as a most affectionate friend and obedient servant.

(Signed) Luis Gonzalez Obregon.

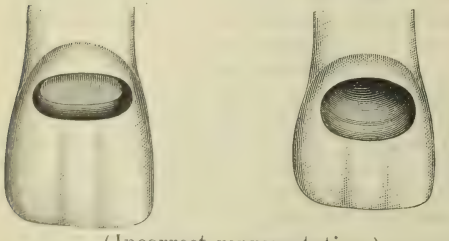
National Museum, Mexico, D. F.,
August 11, 1905.

A CORRECTION FROM DR. C. N. JOHNSON.

To the Editor of the Dental Cosmos:

Dear Sir,—In my article on "Differences in the Preparation of Cavities for Fillings and for Inlays," on page 922, August Dental Cosmos, the illustrations are unfortunately incorrect in detail. This was due to the fact that I was on my vacation, and so far away that the proof did not reach me in time for correction. Figs. 1 and 2 in particular may lead to much misapprehension, and I beg the privilege of correcting them. They were made from models, and the engraver failed to grasp the detail of the interior of the cavity. A longitudinal section of the teeth may give a better idea.

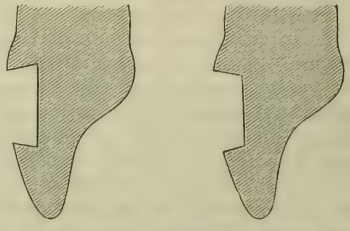
"Fig. 1." "Fig. 2."



(Incorrect representation.)

Fig. 1 is a labial cavity in an incisor prepared for a filling. Fig. 2 is a similar cavity prepared for an inlay. It will be noted that there is no saucer shape to either cavity, such as the original illustration would indicate. It is this saucer shape which has led to many failures in this form of inlay, and I am therefore desirous of having the correction made.

Fig. 1. Fig. 2.



(Correct representation.)

Respectfully yours,
C. N. Johnson.

Chicago, September 1, 1905.

PROCEEDINGS OF SOCIETIES.

FOURTH INTERNATIONAL DENTAL CONGRESS, ST. LOUIS, MO., AUGUST 29 TO SEPTEMBER 3, 1904.

(Continued from page 1100.)

SECTION IX: Education, Nomenclature, Literature, and History—*Continued.*

Chairman—TRUMAN W. BROPHY, Chicago, Ill.
Secretary—WINTHROP GIRLING, Chicago, Ill.

ON motion, Dr. WM. H. TRUEMAN'S paper, "Report of the Committee on the History of Dentistry," was read without discussion.

[This report will be printed in the forthcoming Transactions of the Fourth International Dental Congress.]

The session adjourned at 5.30 P.M.

FIFTH DAY—FRIDAY, SEPTEMBER 2.

The meeting was called to order by the chairman at 3 o'clock.

Dr. JOSÉ J. ROJO, City of Mexico, Mexico, read his paper, "Historical Annotations and the Present Condition of Dental Education in the Capital of the Republic of Mexico," as follows:

HISTORICAL ANNOTATIONS AND THE PRESENT CONDITION OF DENTAL EDUCATION IN THE CAPITAL OF THE REPUBLIC OF MEXICO.

I must begin by making public my profound obligation to the members of the Committee of Organization of this illustrious Fourth International Dental Congress, for the esteemed honor they have conferred on me and the great satisfaction they have afforded me by appointing me a member of the Section on Education, Nomenclature, Literature, and History.

When I consider that the gentlemen on whom the progress of the profession is most directly dependent will be gathered in this section, that it will be here that educational matters, which form the basis of all progress, will be discussed, my satisfaction is still further enhanced by the hope of seeing the problems solved which at present occupy the mind of the educator, thus supplying him with additional knowledge for the more efficient discharge of the duties of his difficult post.

The firm belief that on returning to my country I shall find my ideas on dental education, history, and literature vastly improved, impels me to repeat my thanks to the respected organizers of the Fourth International Dental Congress, and to my esteemed friends who furnished me with the means of increasing my limited knowledge.

At the meeting of the Faculty of the Mexican Dental School, held in June 1904, it was resolved to confer upon me the honorable commission of representing the professors of my country at this congress, and I bear you a sincere and hearty greeting from each and every one of the professors of dentistry in the neighboring republic.

The work I am bringing you is one of great effort, but little fruit. It is divided into two parts. The first part consists of historical annotations on dental instruction in Mexico before and after the discovery of the new world, and the sec-

ond part deals with the present condition of dental education in my country.

ANNOTATIONS ON DENTAL INSTRUCTION AMONG THE TRIBES THAT POPULATED THE WESTERN CONTINENT BEFORE ITS DISCOVERY.

Innumerable were the cities founded here, and varying the degrees of civilization reached by them up to the last days of their prosperity. However, archæological discoveries and the few trustworthy data we possess enable us to state that they all practiced the arts and sciences in some form or other.

A great many of the data given in this paper have been taken from the work of the eminent Professor Flores, entitled "History of Medicine in Mexico," 1881.

Diseases of the mouth of man, no matter how hardy his constitution, exist and have always existed among all races, perhaps from their very beginning, as is proved to us by reading history, and these diseases vary in magnitude according to the factors involved.

The Aztec race, owing to its iron-like constitution, suffered from very few affections of the mouth, but notwithstanding this fact its physicians performed numerous dental operations.

As to dental instruction among the Aztecs, the law of induction leads us to suppose that for the sake of convenience, or owing to their lack of great legislators, or to the knowledge they possessed of the natural laws of heredity, professions were in those remote ages transmitted from father to son.

Ixtlilxochitl, a direct descendant of Netzahualcoyotl, in his historical writings says: "The wise men were charged with the painting of all the sciences they knew and the teaching by heart of all the songs that had any reference to their wars and histories."

This leads us to infer that those who were ambitious of knowledge in those days, and had no means of acquiring it at home, could find the information at certain centers.

Nowadays we are becoming day by day more forcibly convinced of the fact that subdivision of labor is the most powerful lever of all progress, but the probabilities are that in those days the physicians undertook the practice of medicine, surgery inclusive of dental surgery, and perhaps also pharmacy. Only obstetrics constituted a separate profession, which was intrusted to women and transmitted from mother to daughter.

Corresponding to the gods Apis, Apollo, and Æsculapius, the deities of medicine of the old world, the Mayas also had their god of medicine, Sitbolutim and his companion the goddess Yxchel, and the Aztecs their goddess Tzapotlatenan, which proves beyond all doubt that they cultivated medicine.

The Aztecs were familiar with dental pathology and therapeutics, for they knew the properties of a multitude of herbs and prepared them in different ways for the treatment of their ailments. Señor Flores cites the names of a vast number of medicinal plants* in his works. It is certain beyond all doubt that they treated stomatitis, bad breath, toothache, caries, and other affections.

With regard to surgery, there is a fact the importance of which can never be adequately expressed to the dentist who is at all interested in the history of his profession; that fact is the following:

Professor Batres has in the course of his archæological explorations encountered inestimable specimens of human teeth which reveal the degree of culture in dental surgery attained by some of the Aztec tribes. These specimens form a collection of upper human incisors which Professor Batres classifies according to the place of their discovery, as follows: Zapotecas, teeth with inlays of iron pyrites; Mayas, inlays of jade; Taracos, with a groove in the center of the cutting edge; Totonacos, with two grooves in the cutting edge. Professor Batres states that he also found an example of interstitial metallic filling between the molars of one of these crania.

* Mecaxotitl, quimchpatli, chicomecatl, ytzquinpatli, fianquizpepetla, flanchinchinoaxohuitl, yamancapatli, flepatli, flancacaoatl, and many others.

The first specimen is an upper left incisor with an incision in the form of a right angle at the approximal and distal angles of the tooth, thus forming a surface which is the exact reverse of that of nature, there being two right-angled incisions extending throughout the entire thickness of the tooth instead of a round and more or less acute edge. These incisions are not only symmetrical but also present a perfectly polished surface.

In the center of the labial face of the tooth there is an inlay of iron pyrite three millimeters in diameter, symmetrically placed, perfectly circular, and marvelously well fitted; the edges of the inlay are in perfect adaptation to those of the cavity and no adhesive substance can be detected.

It is wonderful that after such an immense lapse of time the tooth and inlay still hold together, owing to either the perfect adjustment or to the presence of some intervening substance.

The inlay is of a dark brown color, resembling that of iron oxid (perhaps this color is the result of age); the body of the tooth is of a normal color, from which we are led to suppose that the substance of the inlay is of such a nature as to render it proof against the action of the saliva. The state of the root shows us that the pulp of the tooth preserved itself in a sound condition, notwithstanding the operation. (See Plate I, Figs. 1 and 4.)

PLATE I.

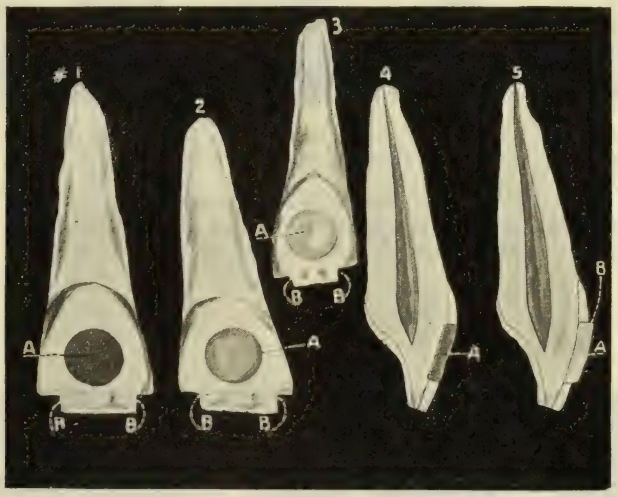


FIG. 1. Front view of incisor of Zapoteca Indian, showing inlay of iron pyrite and mutilated angles. A, Inlay. B, B, Mutilated angles.

FIGS. 2 AND 3. Upper central and lateral incisors of Maya Indian, showing inlays of jade. A, Inlay. B, B, Mutilated angles.

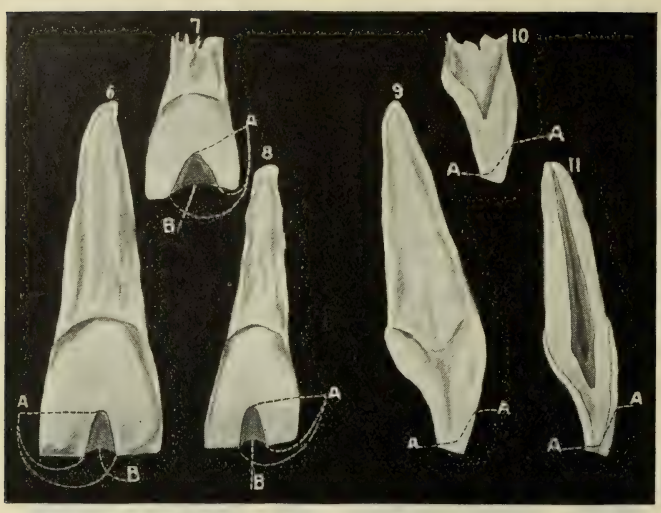
FIG. 4. Vertical section of Fig. 1, showing inlay on a level with the labial surface of the tooth. A, Inlay.

FIG. 5. Vertical section of tooth shown in Fig. 2. A, Inlay. B, Portion of inlay projecting beyond the margin of the cavity.

The second specimen is a central upper incisor, the two angles of which have been cut; this example like the previous one has an incision of about a millimeter and a half on each of its angles, the surface is perfectly smooth, and the vertex of the angle points toward the neck of the tooth.

The difference observed on comparing this specimen with the previous one is that the substance used for the inlay is jade, which the ancients used so much

PLATE II.

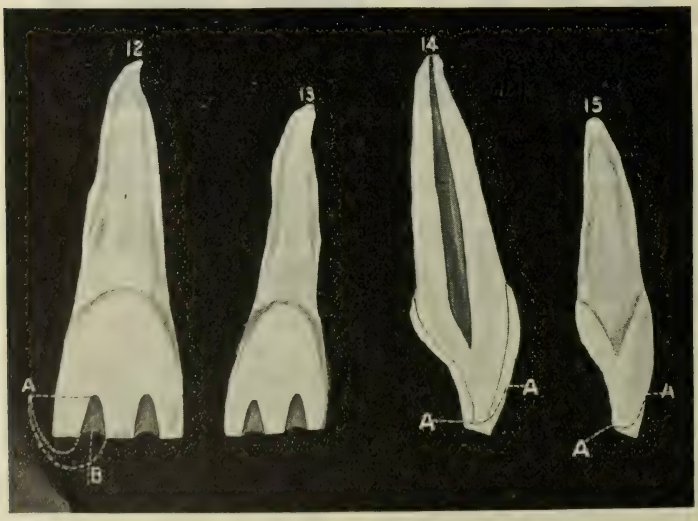


FIGS. 6, 7, 8. Front view of central and lateral incisors of a Trasco Indian, showing a groove in the cutting edge. A, Contour of the groove. B, Greatest depth of groove.

FIGS. 9 AND 10. Lateral view of teeth shown in Figs. 6 and 7. A, A, Dotted line indicating the contour of the bottom of the groove.

FIG. 11. Vertical section of tooth shown in Fig. 8. A, A, Contour of groove.

PLATE III.



FIGS. 12 AND 13. Labial surfaces of central and lateral incisors of Totonaco Indian, with double grooves in the cutting edge. A, Contour of grooves. B, Greatest depth.

FIG. 14. Vertical section of tooth shown in Fig. 12. A, A, Line showing contour of grooves.

FIG. 15. Lateral view of tooth shown in Fig. 13. A, A, Line showing contour of grooves.

for making beads, amulets, and other ornaments. (See Plate I, Figs. 2, 3, 5.)

Some of the inlays are flush with the surface of the enamel, while others protrude about a millimeter above its level; in all the specimens the inlay has a perfectly polished surface.

The third and fourth specimens are central and lateral upper incisors with perfectly symmetrical incisions or grooves; the third specimen has one groove in the

PLATE IV.

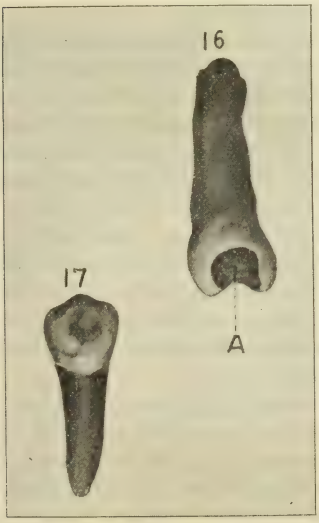


FIG. 16. View of upper canine of the same source of that of teeth with inlays of iron pyrite. A, Cavity from which inlay came out.

FIG. 17. View of a small lower grinding tooth (from same skull as canine shown in Fig. 16), showing the difference between its healthy root and the diseased one of the canine.

center of the cutting edge, and the fourth has two. The bed of these grooves is semilunar in form, and their surface is perfectly smooth. Their approximate dimensions are—A millimeter and a half in width; a millimeter and a half in depth; one and a half or two and a half millimeters in length. The place they occupy is the cutting edge of the tooth; they begin at the lingual face of the enamel, deepen as they approach the labial face of the enamel, and are continued on the labial face of the tooth to a length of from one to two millimeters. (See Plates II, III.)

A coating of a vivid red color, like cinnabar, is observed on the surface of the majority of these teeth.

I shall make one of the inlaid specimens the subject of a few essential observations. It is a canine tooth from the same source as those already described. It also had an inlay, which has fallen out; it has no incisions on its cutting edge. The cavity, which is circular and perfectly cut, occupies over half the crown of the tooth; its exterior diameter is exactly five millimeters, that of its interior is slightly greater, and it has a general depth of about a millimeter and a half.

The cusp is worn away by natural use, this wear extending to the lower border of the cavity made for the inlay. The root of this tooth is porous, its vertex truncated, and its surface rough. A comparison of this tooth with the sound and compact root of another tooth from the same cranium indicates that its root was affected by some morbid process, perhaps caused by the falling out of the inlay and the death of the pulp. (See Plate IV.)

The natural wearing away of the cusp and the loss of the inlay clearly demonstrate that the operation was performed during the man's life, between the ages of twenty-five and thirty, and the state of the root also warrants the supposition that the death, decay, etc., of the pulp set in some time after the inlay fell out.

The fact that these remains were found in earthen vessels, that the crania and other bones contained in the latter are painted red, and the places in which they were found, seem to demonstrate that it was an infrequent operation, perhaps only performed on rulers or priests, or that it was a religious emblem. It may also be taken for granted that it was an operation only performed in the last years of the zenith of progress and prosperity of these races, as the specimens encountered are not numerous.

We can assert after a close study of

these specimens that some of the aboriginal races of this continent practiced operations of a most delicate nature upon the teeth, attaining a very high degree of perfection in their execution, which shows that they were acquainted with the anatomical structure of the teeth, and possessed instruments and the other necessary means for making these inlays, which are a wonderful surprise to those who see them.

Consequently, we can affirm that the Aztecs knew and practiced pathology, therapeutics, and something like dental surgery.

DENTISTRY AFTER THE CONQUEST.

Shortly after the conquest the corporation of the city of Mexico, on January 13, 1523, agreed upon the following resolution: "This day the said gentlemen acting on the petition of Francisco de Soto, barber and surgeon, ordered that as long as it were the pleasure of the said council the salary of fifty dollars in gold a year be assigned to him, and paid to him in three instalments, in consideration whereof the said Soto shall reside in this city and here practice his trades." According to Dr. Flores this was the first decree regarding medical studies in Mexico ever issued by the authorities.

Following the example of the Roman College of Physicians (a licensing and examining board), the city council on January 11, 1527, decreed the formation of a Mexican College of Physicians, of an official character, its object being the supervision of examinations and of the practice of the medical sciences; it also kept a close lookout for quacks, punishing all those who attempted to practice a profession without possessing the necessary qualifications.

Between the years 1551 and 1553 of the viceroyalty the Spanish government issued a decree ordering the foundation of a university in Mexico. During the early years of its existence this institution devoted all its efforts and resources to the teaching of theology, and it was not until the year 1580 that the first professorship of medicine was founded. However, a long period elapsed before medicine was properly taught; a perusal of historical data tells us that it was only in 1816, or six years after the declaration of independence, that there were four professorships of medicine, and it is only after that date that medicine can be said to have had a special course devoted to it.

The first text-books used in this university were based on the doctrines of Hippocrates, Galen, and Güido, from which it is evident that the mouth was studied in the classes of anatomy and surgery, although but little attention was given to that organ.

At that time the study and practice of medicine were divided among the following: physicians, surgeons, pharmacists, phlebotomists, bone-setters, and midwives. Physicians and surgeons were obliged to study and graduate at the university; the others were required to possess the rudimentary knowledge necessary for their trade, and had to give a practical demonstration before the College of Physicians to be able to obtain a license or diploma authorizing them to practice their trade.

The above regulation, with very slight modifications, existed during a great many years. In 1833 one of the first presidents of the republic ordered the university to be closed.

The closing of the university that had existed so many years must have caused great agitation at the time, but the president, Doctor Gomez Faríaz, thoroughly convinced of the wisdom of his orders, shortly afterward—that very same year, in fact—ordered an Institution of Medical Sciences to be founded. This was without question the beginning of the era of progress of medicine in Mexico.

After the foundation of the new school the study of medicine and general surgery made remarkable progress in Mexico notwithstanding the fact that the constantly recurring dissensions and revolutions of that epoch obliged the school to close its doors for some time on different occasions.

The professions of pharmacy, obstetrics, and phlebotomy did not receive any great benefit during that early period,

and continued subject to the regulations of the epoch of the university, with very slight modifications.

In 1870 the study of pharmacy and obstetrics received the attention of our legislators, and new chairs for the teaching of these two professions were founded at the School of Medicine.

The studies of the phlebotomists and dentists, formerly called barber-surgeons, were but slightly changed during that period.

In the course of the years 1841 to 1866 the profession of phlebotomy became gradually substituted by that of dental surgery; the records of that period show that there were examinations for both those professions, but after 1866 there were no more candidates for the examinations in phlebotomy, while the applicants for dentistry increased considerably.

The instruction in dentistry continued to improve during the last stages of this period, for although there were no special courses for the study of that profession, the candidates could acquire the necessary knowledge, as a group of physicians (nearly all being professors of the School of Medicine) gave private classes of descriptive anatomy, dissection, histology, bacteriology, therapeutics, and dental surgery; besides this, the candidates had to present to the secretary of the school, together with their application for an examination, a certificate sworn before a notary testifying that they had practiced all the surgical and prosthetic operations in the surgery of a qualified dentist. If this application was admitted the candidate was examined in order to test his proficiency, and in the event of his being successful the department of public instruction gave him a diploma. The last diploma of a dentist and surgeon obtained by this procedure was issued in 1900.

The latest stage in the evolution of the dental profession in Mexico began in 1896. At about that time several corporations and some private persons approached the president of the republic and the minister of justice and public instruction with petitions asking for the establishment of a special school for the teaching of dentistry. Three different schemes were proposed: The establishment of a private institution which the government would aid pecuniarily and invest with an official standing; the next proposed that the government should found a national dental school entirely independent of the National School of Medicine; the third and last was that a school of dentistry should be established as an annex of the National School of Medicine.

The government, realizing the necessity of the proposed institution, appointed a commission, formed by the eminent doctors of medicine Don Manuel Carmona y Valle, Don Rafael Lavista, and Eduardo Liceaga, to reform the plan of studies of the School of Medicine, and at the same time consider the best manner of regulating the study of dental surgery.

The consideration of such a complex matter naturally required some time, but in the end the decision proved favorable to the dental profession.

During this period there was considerable activity among the dentists. In 1896 the well-known engineer, Don Sebastian Camacho, aided the efforts of a group of dentists by furnishing the necessary funds for the establishment of a private school of dentistry. The school was not properly organized and was closed after an ephemeral existence of four or five months.

About two years later Dr. Soriano, a dentist, established a private dental college; but it did not flourish, and shared the same fate as the other.

EFFORTS OF THE MEXICAN DENTAL SOCIETY.

In the very first year of its foundation one of its members, Juan Falero, was the first to advance the idea of forming a dental school, during the session of August 3, 1898. On September 7, 1898, Drs. Carmona and Engberg made a motion that a petition be addressed to the president of the republic, protesting against the existing regulations affecting

the study of dental surgery and the examinations. At the next session the proposal was discussed, approved, and carried into effect.

On November 25, 1898, all the members being in attendance, the project of founding a dental dispensary was discussed. The idea was to afford students of dentistry opportunities for practice, and at the same time to provide a suitable place in which the poor could be treated and the society also hold clinics and sessions. In the session of December 7, 1898, the plan of founding a dispensary was read, discussed, amended, and approved, Dr. Carmona being elected its director and Dr. Reguera its secretary and treasurer.

Session held December 5, 1900. Dr. F. Pastor, one of its members, returned after having attended the International Dental Congress in Paris as an official delegate. Dr. Pastor sent a report to the president of the republic on the result of his mission, and acting on the suggestion of the Mexican Dental Society, particularly that of Dr. Ricardo Crombe, explained to him the imperative necessity of a dental college in Mexico.

Session held November 28, 1901. The president of the society informed the assembly that Dr. Liceaga, the director of the National School of Medicine, had asked the society to appoint a commission of its members to formulate a plan of studies and regulations for the profession of dental surgery, and to make out a list of the equipment required for the future school. Several members discussed the matter at this session without reaching any definite decision, whereupon the chairman called for another meeting, and requested the members to give the matter their full attention and consideration, so that this most commendable project might be decided upon at the next session.

Session held December 11, 1901. The president of the society announced that he had already delivered to Dr. Liceaga the proposed plan of instruction for the profession of dental surgery.

Session held February 12, 1902. It was announced to the assembly that Dr. Liceaga had informed the Mexican Dental Society that the plan of studies presented by them had been officially adopted and incorporated into the laws of the country and duly promulgated in the official gazette (*Diario Oficial*).

September 24, 1902, the government commissioned the writer of this paper to visit and study the dental colleges of the United States of America. He was most courteously and kindly received at all the great institutions he visited, and on his return presented a detailed report. This report was officially published in the *Bulletin of Public Instruction* of March 10, 1903.

As soon as the secretary of justice and public instruction, Lic. Don Justino Fernandez, understood the necessity of establishing a school of dentistry, he took great pains to accomplish the realization of the project. Accordingly, when toward the end of 1901 Dr. Liceaga presented his plan of studies and regulations for the National School of Medicine, he ordered the study of dentistry to be included in it, as he favored the idea of making the proposed school a branch of the School of Medicine. On January 11, 1902, the president of the republic, in the law referring to the course of study to be followed in the National School of Medicine, and acting in conjunction with the secretary of justice and public instruction, ordered the courses for the study of dentistry to be included in the plan, and that the necessary professorships be established.

After this the rules to be observed in the new department were formulated, the arrangement and equipment of the premises decided upon, and the professors appointed.

As an honor deservedly due to them, I shall enumerate the founders of the dental school whose advent marks the beginning of a new era in the annals of Mexican dentistry: The president of the republic, who as a lover of all that tends to progress and improvement, cordially greets and esteems all that redounds to the benefit of the nation. The secretary of justice and public instruction, Lic. Don Justino Fernandez, who, zealous in

the discharge of his high mission and recognizing the benefits that would accrue from the founding of a school of dentistry, facilitated the necessary appropriations and personally inaugurated the new institution. The sub-secretary of justice and public instruction, Lic. Don Justo Sierra, who realizing the importance of the new school, exerted all his efforts in behalf of its foundation. Dr. Don Eduardo Liceaga, the director of the National School of Medicine, who lent his vast scientific knowledge toward the creation of the new school.

To conclude I must express a kind remembrance of the faithful members of the Mexican Dental Society who witnessed the realization of their ideal.

THE SCHOOL OF DENTISTRY ANNEXED TO THE NATIONAL SCHOOL OF MEDICINE.

This institution, called the "Consultorio Nacional de Enseñanza Dental," and inaugurated April 16, 1904, is a branch of the National School of Medicine, and with it forms a part of the general scheme of professional schools, owing to which fact it is closely related to the Superior Board of Public Education and the National Preparatory School.

The Superior Board of Public Education is an advisory body formed of the directors of all the higher educational institutions.

THE NATIONAL PREPARATORY SCHOOL.

As can be readily understood, this is a preparatory institution for the professional schools. No students are admitted unless they have completed their primary or elementary education. All applicants for admission into the professional schools must present a certificate testifying that they have studied and passed an examination of all the courses of the preparatory school.

The curriculum extends over a period of six years and is as follows:

First year. Elementary algebra; plane and solid geometry; first course of French; first course of Spanish; first course of freehand drawing; gymnastics.

Second year. Plane trigonometry and the elements of spherical trigonometry; analytical geometry and the elements of infinitesimal calculus; second course of French; second course of Spanish; second course of freehand drawing; gymnastics.

Third year. Elements of mechanics and cosmography; physics; first course of English; third course of Spanish; Greek roots; third course of freehand drawing; gymnastics.

Fourth year. Chemistry; elements of mineralogy and geology; elements of meteorology; general geography and climatology; second course of English; fourth course of Spanish; fourth course of freehand drawing; gymnastics.

Fifth year. Botany; elements of anatomy and physiology of the human body; American and national geography; universal history; third course of English; general literature; first course of mechanical drawing; fencing and target-practice.

Sixth year. Psychology; logic; sociology and ethics; national history; fourth course of English; Spanish and Mexican literature; second course of mechanical drawing, and the elements of topographical drawing; fencing and target-practice.

BUILDING AND EQUIPMENT OF THE SCHOOL OF DENTISTRY.

The building is divided into twelve compartments conveniently arranged: The director's and secretary's offices; a well-furnished reception room; a hall for surgical operations and clinics (14 x 8 meters) with six windows facing the north, provided with six Wilkerson chairs, dental engines with their respective brackets and spittoons, apparatus for disinfecting, a complete supply of instruments for the professors, electric power, etc.; a room (6 x 6 meters) for operations with general anesthesia, with two windows facing the north, equipped with the latest pattern S. S. White Dental Mfg. Co.'s chair, a gasometer for

nitrous oxid, and all necessary instruments and apparatus for performing surgical operations on the mouth; a general storeroom, well stocked with materials, utensils, etc.; cloak and toilet rooms for the professors; a lecture room with accommodations for eighty students; a laboratory for gold and metal work, with the necessary tables and apparatus; a laboratory for rubber and celluloid work; a laboratory for fire and acid work; cloak-room and toilet room for the students; museum and library.

Methods of Instruction. In all subjects oral, objective, and experimental or practical methods are employed.

SUBJECTS STUDIED BY DENTAL STUDENTS AT THE SCHOOL OF MEDICINE.

First year. Descriptive anatomy and dissection, three classes a week; histology, especially that of the elements of the mouth, three classes a week.

Second year. Topographical anatomy, that which refers to dental surgery; physiology, three classes a week; morbose processes, three classes a week.

Third year. Bacteriology and microscopy, three classes a week.

NATIONAL SCHOOL OF DENTISTRY.

The methods of instruction are essentially practical and are divided into two parts. The oral methods consist of lectures amplified by the use of text-books and always illustrated by the objective system. The practical methods consist of clinics and the execution of all the surgical and prosthetic operations under the supervision of the professors.

First year. First course of dental surgery, with daily attendance at the clinics from 8 to 10 A.M., and three lectures a week. First course of prosthetic dentistry, daily attendance at the clinics and laboratories from 2.30 to 4.30 P.M., two oral lessons a week; dental metallurgy, one lesson a week.

Second year. Dental materia medica, two lessons a week; second course of operative dentistry, daily attendance at the clinics from 8 to 10 A.M., and three oral lessons a week; second course of prosthetic dentistry, daily attendance at the laboratories from 2.30 to 4.30 P.M., and three lectures a week.

Third year. Dental pathology, three lessons a week; dental surgery, third course, with daily attendance at the clinic from 8 to 10 A.M., and three oral lessons a week; third course of dental prosthesis, daily attendance at the laboratory from 2.30 to 4.30 P.M., three lectures a week; special course of orthodontia, three lessons a week, both theory and practice.

Besides the above the students go and practice at the general hospital whenever the professors and director consider it necessary.

LENGTH OF THE COURSES.

The curriculum is divided into three separate years. The classes meet on January 7th and close on September 30th; the sessions are suspended on national holidays and for a week in spring.

TEXT-BOOKS.

Descriptive Anatomy: B. Beauni. Topographical Anatomy: P. Tillaux. Normal Histology: S. Ramon y Cajal. Physiology: J. P. Langlois and Varigny. General Morbid Processes: Sanchez Ocaña. Bacteriology: Albert Besson. Dental Pathology: Frank Abbott. Dental Materia Medica: Frank Abbott. Operative Dentistry: American Text-Book of Operative Dentistry, Edward C. Kirk. Orthodontia: E. H. Angle. Prosthetic Dentistry and Dental Metallurgy: C. J. Essig. Crown-, Bridge-, and Porcelain-Work: G. Evans.

EXAMINATIONS.

The ordinary examinations of all the courses are generally held from October 15th to November 15th. The general or graduation examinations are held at any time between January 15th and September 15th.

The tests at the examinations are both theoretical and practical. The first are oral and written, and the second consist of the performance of operations.

Discussion.

A. H. THOMPSON, Topeka, Kans. I was much interested in this excellent paper and congratulate Dr. Rojo upon his careful researches, especially among Spanish archives, for he has certainly given an excellent presentation of the condition of dental education in Mexico. I was especially interested in these archæological specimens and would like to know if any of them were set with hematite or turquoise. The nicety of the operation is quite interesting, and one cannot but wonder how they drilled these holes so symmetrically. The holes may have been made in some way similar to the manner in which these primitive people drilled holes in crystals, with a reed tool and sand and water. Yet it took a lifetime to do it, as a rule, and these holes were evidently drilled during the life of the patient, so that they probably did it with a drill. I would like to know what the cementing substance was that they used. It probably was bitumen. There are some specimens in the New York Museum of Natural History which seem to have been set with bitumen. Dr. Seville has some specimens set with hematite and jade. An interesting thing is the notches that are cut on the edges. Dr. Seville has some cut with double notches. In one skull all six of the anterior teeth are cut with double notches like a step. This evidently has some religious significance, for some of the idols have these same notches cut in their teeth. The notches probably have some relationship to the storm clouds and the rain prayer, but the mythology is so complicated it is hard to trace the connection.

Dr. V. GUERINI, Naples, Italy. I find the paper of Dr. Rojo very interesting, especially the part that speaks of the fillings. It would be still more interesting if he could establish, approximately at least, at what epoch this special work was done. I would like to know someone in this country who has made a study of this subject. I hope the photographs of these specimens will be published in the Transactions.

Dr. ROJO (closing the discussion). I have not seen specimens set with hematite or turquoise. The specimens that I have seen and mentioned were of iron pyrite of a brown color, and of jade—this of a light green color resembling turquoise. I do not know what substance was used as a cement.

Replying to Dr. Guerini's question: The time was approximately about the year 1300, and I shall be very glad to give Dr. Guerini the address of Prof. Leopoldo Batres, who is probably the best authority on the subject.

On motion, the paper by Dr. BURTON LEE THORPE of St. Louis, Mo., entitled "A Biographical Review of the Careers of Hayden and Harris," was, in the absence of the author, read by title.

[This paper was printed at page 1047 of the September issue of the COSMOS.]

On motion, the paper by Dr. M. CHIWAKI of Tokio, Japan, entitled "Dentistry in Japan," was, in the absence of the author, read by title.

[This paper is printed at page 1201 of the present issue of the COSMOS.]

On motion, the paper by Dr. H. O. HEIDÉ of Christiania, Norway, entitled "The Training of Dentists in Norway," was, in the absence of the author, read by title.

[This paper will be printed in the forthcoming Transactions of the Fourth International Dental Congress.]

The CHAIRMAN. It has been very gratifying to us to listen to these excellent papers and I feel that when the Transactions of this congress shall have been prepared that all interested in the subjects here named, history, education, literature, and nomenclature of dentistry, will find that the products of this section will be very valuable. It has been to me a very great pleasure to have listened to these papers. As to the work we have done in this section of the Fourth International Dental Congress, I am sure everyone who has been here will be proud of the work. There were fifteen papers, and the report from Manila being in

three sections, that would make seventeen, and I believe this will be the banner section in the number of papers presented, every one of which has been of interest. We have brought out here the development of dental education in the United States, France, Mexico, Japan, Norway, the Philippine Islands, and Italy, and an examination of these papers showing the work that has been accomplished up to the present time in dental education will furnish most valuable information to anyone interested in the work.

I desire to especially thank all who have been present for the earnestness exhibited here at all times. Though we have not had a large audience we have always had a very enthusiastic one, showing very great interest in the work under consideration.

The Chairman then declared Section IX of the Fourth International Dental Congress adjourned *sine die*.

SECTION X: Legislation.

Chairman—William Carr, New York, N. Y.
Secretary—L. Ashley Faught, Philadelphia, Pa.

First Day—Monday, August 29.

The section met and adjourned to reconvene at a time and place to be subsequently announced.

Second Day—Tuesday, August 30.

The Chairman called the section to order at 2.30 p.m. Dr. H. C. Brown of Columbus, O., acted as secretary *pro tem.*

The Chairman then read his address, as follows:

Chairman's Address.

Gentlemen of Section X,—It gives me great pleasure to welcome to this section so many eminent members of our profession, and particularly to extend the hand of good fellowship to our brethren from across the sea. It is encouraging to see so many gentlemen who have traveled hundreds and thousands of miles to take part in such a congress as is assembled in St. Louis at this time, and all animated by the desire to do what we may for the good of our chosen profession. I must say without any desire to belittle the work of other sections, that ours is one of the most important in bringing our profession to its proper position as a branch of medical science. Without dental legislation dentistry would soon sink to the level which it occupied so many years ago when barbers and bloodletters generally practiced dentistry—save the mark!—and when a dentist occupied a position no higher than that of a barber of today.

Professional legislation has been the work of the last twenty-five years of my life. During that time we have made a hard fight in our state of New York to secure the enactment of laws which would govern wisely and well the study and practice of dentistry and at the same time prescribe the preliminary education requisite for those who desire to study dentistry with the view to practice. In the report which will be read to you I have attempted, as well as possible in the necessarily limited time at my disposal, to make a comparison between the laws of our country and those of foreign governments. This report will show generally that while our higher professional education may be and doubtless is equal to that of foreign countries, it is the standards of preliminary education in which our states are generally deficient, and it is our duty, in my opinion, to strive to raise the standard of our respective states in this particular, if not to that of the state of New York, at least to a degree commensurate with its requirements.

I desire to thank the eminent gentle-

men who have so kindly contributed papers bearing on the subject-matter of our deliberations, and trust that our discussions of these papers as well as the report will be thorough and general, and further, if possible, that we may formulate a plan and decide upon ways and means whereby such legislation as may be necessary to unify the laws and impose parallel conditions regarding preliminary education preparatory to professional training may be enacted.

Again thanking you all, gentlemen, for your attendance, and trusting that our work may not be in vain, let us now proceed to the business for which we have assembled.

Dr. L. C. Bryan, Basel, Switzerland, was called to the chair as honorary chairman, and the chairman, Dr. WILLIAM CARR, read his report, as follows:

A REVIEW OF INTERSTATE AND INTERNATIONAL DENTAL LEGISLATION.

Gentlemen,—As chairman of Section X, on Dental Legislation, I beg to report as follows: It is with considerable difficulty that we have been able to obtain copies of the laws governing the study and practice of dentistry in foreign countries, and the data at hand are far from complete, although the best procurable after months of effort.

A compilation has been made of the various laws regulating dentistry in the United States, and it is our purpose to summarize and compare these statutes separately, afterward comparing them with the laws of foreign countries in our possession.

After careful study and comparison of the laws regulating study and practice of dentistry in the United States and its territories, we have tabulated the result of our research below, in two tables, one giving an analysis of the laws in force in 1899, the other being brought up to July 1, 1904.

Examination of these tables will show at a glance the elevation of standards and general progress in dental legislation during the five years just passed.

SYNOPSIS OF REQUIREMENTS IN 1899.

In twenty-three states dental diplomas do not now confer the right to practice, an examination being required in all cases:

Alabama	New Jersey
Colorado	New York
Connecticut	North Carolina
Delaware	Oregon
Florida	Pennsylvania
Georgia	Rhode Island
Idaho	South Carolina
Maine	Vermont
Massachusetts	Virginia
Minnesota	Washington
Mississippi	West Virginia
New Hampshire	

The following require for admission to the licensing examination:

Colorado. Diploma from legally organized reputable dental school.

Connecticut. Diploma from recognized dental school, or three years' instruction, or three years' practice.

Delaware. Diploma of recognized dental school.

Florida. Diploma from reputable dental school.

Georgia. Diploma from reputable dental school.

Idaho. Three years' experience, certificate from another state board, or diploma from legally organized dental school.

Minnesota. Diploma from reputable dental school, or evidence of ten years' continuous practice previous to September 1889.

New Jersey. Common school education, diploma from recognized dental school or a written recommendation from five experienced dentists.

New York. Full high-school course, degree from registered dental school or medical degree with a special two years' dental course.

Oregon. Diploma from dental school in good standing, or study and practice in Oregon prior to this act.

Pennsylvania. A competent common school education, diploma of recognized dental school.

Virginia. A fair academic education.

Washington. Diploma from recognized dental school or evidence of ten years' practice.

The following require the licensing examination only:

Alabama	North Carolina
Maine	Rhode Island
Massachusetts	South Carolina
Mississippi	Vermont
New Hampshire	West Virginia

In the following political divisions either approval of dental diploma or examination by state or other duly qualified board is required:

Arizona	Montana
California	Nebraska
District of Columbia	Nevada
Hawaii	New Mexico
Illinois	North Dakota
Indiana	Ohio
Iowa	Oklahoma
Kansas	South Dakota
Kentucky	Tennessee
Louisiana	Texas
Maryland	Utah
Michigan	Wisconsin
Missouri	

The following requiring either approval of diploma or examination, admit to examination on conditions named:

Iowa. Satisfactory evidence of three years' study.

Missouri. Three years' study with legally registered dentist or license from another state.

Montana. Three years' practice or three years' study under licensed dentist.

North Dakota. Three years' active practice or three years' study with practitioner.

Utah. Two years' practice or two years' study under licensed dentist.

Arkansas. Requires only a diploma approved by the board.

Wyoming. Requires only presentation of diploma to unqualified local officers.

Cuba, Philippine Islands, and *Porto Rico.* The requirements are in process of transition.

Alaska and *Indian Territory* have no laws.

SYNOPSIS OF PRESENT REQUIREMENTS. JULY 1, 1904.

For purposes of comparison the synopsis of requirements in force in 1904 follow those in force in 1899. An interesting comparison can be instituted from these two synopses showing the advancement made in requirements for admission to dental practice in the United States during the five years, 1899 to 1904.

In thirty-four states dental diplomas do not now confer the right to practice, an examination being required in all cases:

Alabama	Mississippi
Arizona	Montana
Arkansas	New Hampshire
California	New Jersey
Colorado	New York
Connecticut	North Carolina
Delaware	Ohio
Florida	Oregon
Georgia	Pennsylvania
Hawaii	Philippines
Idaho	Rhode Island
Indiana	South Carolina
Iowa	Utah
Louisiana	Vermont
Maine	Virginia
Massachusetts	Washington
Minnesota	West Virginia

The following require for admission to the licensing examination:

Arizona. Diploma from reputable dental school, member of the National Association of Dental Faculties or four-year high-school course and three years' apprenticeship with licensed practitioner, or certificate from a state board showing five years' practice as licensed dentist.

California. Diploma of reputable dental school indorsed by state board of dental examiners, or three-year high-school course and four years' dental apprenticeship, or certificate of examining board of another state showing five years' practice.

Colorado. Diploma from legally organized reputable dental school.

Connecticut. Diploma from recognized dental school, or three years' instruction, or three years' practice.

Delaware. Diploma of recognized dental school.

Florida. Diploma of reputable dental school.

Georgia. Diploma of reputable dental school.

Hawaii. Diploma of reputable dental school.

Idaho. Three years' experience, certificate from another state board, or diploma from legally organized dental school.

Iowa. Diploma of reputable dental school.

Indiana. Diploma recognized by National Association of Dental Faculties or five years as assistant to licensed dentist.

Minnesota. Diploma from reputable dental school, or evidence of ten years' continuous practice previous to September 1889.

Montana. Diploma of reputable dental school, or five years' dental practice, or five years' study under licensed dentist.

New Jersey. Common school education, diploma from recognized dental school, or a written recommendation from five experienced dentists.

New York. Full high-school course, degree from registered dental school or medical degree with a special two-year dental course.

Ohio. Diploma from a legally chartered dental school.

Oregon. Diploma from dental school in good standing, or study and practice in Oregon prior to this act.

Pennsylvania. A competent common school education, diploma of recognized dental school.

Philippine Islands. Diploma from legally incorporated dental school.

Utah. Diploma recognized by National Association of Dental Examiners, or ten years' practice, or three years' study with licensed dentist.

Virginia. A fair academic education.

Washington. Diploma from recognized dental school, or evidence of ten years' practice.

The following require the licensing examination only:

Alabama	North Carolina
Maine	Rhode Island
Massachusetts	South Carolina
Mississippi	Vermont
New Hampshire	West Virginia

In the following political divisions either approval of dental diploma or examination by state or other duly qualified board is required:

District of Columbia	Nevada
Illinois	New Mexico
Kansas	North Dakota
Kentucky	Oklahoma
Maryland	South Dakota
Michigan	Tennessee
Missouri	Texas
Nebraska	Wisconsin

The following, requiring either approval of diploma or examination, admit to examination on conditions named:

Missouri. Three years' study with legally registered dentist or license from another state.

North Dakota. Three years' active practice, or three years' study with practitioner.

Porto Rico. Diploma approved by Superior Board of Health.

South Dakota. Three years' practice or three years' study with practitioner.

Wyoming. Requires only presentation of diploma to unqualified local officers.

As will be seen, in 1899 there were only twenty-three states in which a dental degree alone did not confer the right to practice, an examination being required in all cases. In 1904, however, we find these conditions existing in thirty-four states, a very gratifying and material increase in number.

Comparison of the requirements of the various states, however, discloses a wide divergence in the standards of preliminary education. An encouraging fact, however, is that the increase has been steady, and it is to be hoped that in the near future some concerted action may be taken by the various state authorities whereby the educational standards may be made to conform to a uniform regulation. This action is necessary not alone for the purpose of securing a higher degree of collegiate training, but also to enable us to secure recognition from foreign countries, which the low standards prevailing in many states now tend to prevent. The general raising and systematizing of standards will also enable us to secure reciprocity with foreign countries. The standards of the schools and colleges are fairly uniform today, and the bar to foreign reciprocity and recognition of our degrees is our low standard of preliminary education.

In order that the question of preliminary and professional education may be intelligently discussed, it is necessary to carefully examine the requirements of the various countries as compared with the requirements of the state of New York, which possesses the highest standard in the United States today. For this purpose we have made a comparative list of the educational requirements of England, Germany, and France, together with those of New York state, as we regard the three countries mentioned as being representative of foreign countries, which, although they vary somewhat in detail, are practically the same:

EDUCATION PRELIMINARY TO DENTAL REGISTRATION.

England.	Germany.	France.	New York State.
English language, including grammar and composition; Latin, grammar and translation; arithmetic, algebra, geometry, Greek or a modern language.	Seven-class gymnasia is preliminary to the study of dentistry. (A full nine-class gymnasia is equivalent to the Freshman year in a first-class college in the United States.	The preliminary education required is a diploma of "Bachelor," or a certificate of the superior primary studies (equivalent to a high-school course.) These studies comprise French, geology, botany, natural history, physics, arithmetic, algebra, and geometry.	January 1, 1905. Full four-year high-school course. (See below for detailed high-school course.)

Ireland, Scotland, and Wales are governed by the same laws as England, so far as the study and practice of dentistry are concerned, and the same requirements are in force. This applies in a measure to Canada, Australia, and other English provinces, although no local statutory provision is made for preliminary education.

Japan has but one dental institution, the Tokio Dental College, which requires as a preliminary to a course of dental instruction the passage of an examination in the following subjects:

1. History, general and Japanese.
2. Elementary physics and chemistry.
3. Rhetoric, Japanese, and English.
4. Arithmetic.
5. Algebra.
6. Geometry.

Every candidate for graduation must have devoted three years to the study of dentistry, including the college course, or have attended three full courses of lectures in this college. At the end of the third year, after having passed a satisfactory examination in the theoretical branches, performed an oral operation in the dental infirmary of the college, and satisfactorily completed an operation in mechanical dentistry, the candidate receives a degree and is thereafter entitled to practice in the empire of Japan.

In order that we may understand the comparisons which follow, we give below the curriculum of a representative high school in New York state:

Year.	*Term.*	*Studies.*
1	1	First year English. First year Latin, U. S. history, Physiology.
1	2	First year English, First year Latin, Civics, Physical geography.
2	1	Second year English, Cæsar, First year Greek, Algebra.
2	2	Second year English, Cæsar, First year Greek, Algebra.
3	1	Third year English, Cicero, Anabasis, Plane geometry.
3	2	Third year English, Latin composition, Anabasis, Plane geometry.
4	1	English reading, Virgil's Æneid, Homer's Iliad, Greek history.
4	2	English reading, Virgil's Æneid, Mathematics or science, Roman history.

A regents' diploma is required for graduation. This is granted to any candidate who successfully passes an examination in the following subjects:

English,	8	counts.
Science,	8	"
Mathematics,	8	"
History and social science,	8	"
Optional,	16	"
	48	"

The term "count" represents ten weeks' work in one of these studies.

It is difficult to give a representative course in an English secondary school, as the courses differ widely; but the English base their standards so fully upon examination tests that the curriculum of the school itself has little weight. The regents of the University of the State of New York regard the credentials earned in the English "preliminary" examination as equivalent to two years' high-school course, and the "first professional" examination as equivalent to the requirements for a dental student's certificate in this state.

In New York, the certificate of a nine-class German gymnasium is equivalent to the freshman year in a registered college of the first class, and the "maturity certificate" of a "real-schule" fully equal to a four years' high-school course.

REQUIREMENTS IN ENGLAND.

The "first professional" examination in England is identical with part one of the first examination of the examining board in England. Before admission to

this examination the candidate must produce a certificate of having received instruction (which may be taken prior to the date of registration as a dental student) at a regularly recognized institution in chemistry, physics, and practical chemistry.

Of having been engaged during a period of not less than three years in acquiring a practical familiarity with the details of mechanical dentistry under the instruction of a competent practitioner or under the direction of a superintendent of the mechanical department of a recognized dental hospital. Qualified surgeons afford evidence of two instead of three years' instruction.

Of registration as a dental student by the General Medical Council.

Of having attended at a recognized dental hospital and school, (a) a course of practical dental metallurgy; (b) a course of lectures on dental metallurgy; (c) a course of lectures on dental mechanics; (d) a course of practical dental mechanics, including the manufacture and adjustment of six dentures and six crowns.

Candidates may present themselves for the first professional examination after six months' attendance at a recognized dental hospital and school. The examination in dental metallurgy will be by written paper.

The second professional examination: A candidate must possess the following certificates:

Of having been engaged during four years in the acquirement of professional knowledge subsequent to the date of registration as a dental student.

Of having attended at a recognized dental hospital and school: (a) a course of dental anatomy and physiology; (b) a separate course of dental histology, including preparation of microscopic sections; (c) a course of dental surgery; (d) a separate course of practical dental surgery; (e) a course of not less than five lectures on the surgery of the mouth; (f) a course of dental materia medica; (g) a course of dental bacteriology.

Of having attended a recognized dental hospital or in the dental department of a recognized general hospital, the practice of dental surgery during two years.

Of having attended at a recognized medical school: (a) a course of lectures on anatomy; (b) a course of lectures on physiology; (c) a separate practical course of physiology; (d) a course of lectures on surgery; (e) a course of lectures on medicine.

Of having performed dissections at a recognized medical school during not less than twelve months.

Of having attended at a recognized hospital the practice of surgery and clinical lectures on surgery during two winter sessions.

Of being twenty-one years of age.

Certificates of professional study must show that the students have attended the course of professional study to the satisfaction of their teachers. Candidates may present themselves for the second professional examination after the completion of four years' professional study from the date of registration as a dental student and after the lapse of not less than six months from the date of passing the first professional examination.

The second professional examination consists of two parts: (1) General anatomy and physiology, general surgery and pathology; (2) Dental anatomy and physiology, dental pathology and surgery, and practical dental surgery.

As stated, the first professional examination is registered by the University of the State of New York as meeting the full requirements for the dental student's certificate; evidence of the successful completion of all the dental courses with the requirements in mechanical dentistry is registered by the University as meeting the requirements for admission to the third year of a registered dental school of the United States. The degree of licentiate in dental surgery (L.D.S.) is registered by the University as meeting the professional requirements for admission to the dental licensing examination of the state of New York.

This recognition of the English degree of L.D.S. is not reciprocated. It is manifest that the discrimination shown is due to the fact that there is no uniform

standard in the United States similar to their own.

At first glance it may seem that the law of the state of New York is harsh and arbitrary, and to work an injustice to candidates of limited means, or who may not have had the time or opportunity to procure a high-school certificate. This is not the case, however, as the law will accept forty-eight regents' academic counts as equivalent to a four years' high-school course, these counts being obtained by examination held by the regents simultaneously in four of the largest cities of New York state four times a year. These examinations may extend over an indefinite period, the candidate receiving credit and a regents' pass card for each subject which he passes successfully, and, upon the completion of his examinations and his return to the regents of the cards representing his forty-eight academic counts, he receives a dental student's certificate, exactly the same as that granted to the holder of a high-school certificate or diploma. The dental student's certificate, however, must be obtained two years prior to graduation and the granting of a degree.

REQUIREMENTS IN DENMARK AND OTHER EUROPEAN COUNTRIES.

Denmark has no statutory requirement as to preliminary education. The student desiring to commence the study of dentistry must show two years' apprenticeship in the workroom or laboratory of one or more dentists. He cannot complete his examinations for graduation until he is twenty-one years of age, and cannot practice until he is twenty-five years of age and has worked two years after graduation as an assistant. The course in dentistry is two years. Every Danish surgeon, if licensed, is allowed to practice dentistry.

Regarding license and the rules governing the examination of candidates in European countries, the licensing boards are usually composed of medical men, generally including one or two dentists in their number. This does not seem just, in our opinion, as a board of dental examiners should consist entirely of dentists, who are naturally better qualified to examine candidates for admission to license, knowing what is required by the needs of their profession, and understanding more thoroughly than it is possible for medical men to do, just what knowledge the candidate possesses or should possess in order to obtain a license.

The Chairman. Gentlemen, you have heard the report of Dr. Carr, which was exceedingly interesting, and I would ask any of those interested in the discussion of this subject to let us hear their voices.

Dr. Carr. If it be the pleasure of those present, we might listen to Dr. Anema's paper, and then discuss both papers together.

The suggestion having been approved, Dr. René Anema, Rotterdam, Holland, then read the following paper:

The Value of Dental Legislation.

A little prologue is given to point toward the common troubles in the discussion of sociological problems.

As my essay touches upon sociology and the relation of dentistry to the commonwealth, it may be remembered that sociology often gets mixed with politics. Talleyrand, the famous French statesman and diplomat, used speech to conceal thoughts. Many a dental diplomat and lawmaker apparently does the same. This is a source of difficulty when one comes to the treatment of dental sociological questions.

Next to the diplomat, and even more dangerous, stands the preacher, the man with ideals too high for utility, whose enthusiasm allows his heart to go astray with his head. May we be both open-hearted and open-minded by freely uttering our thoughts and trusting to fraternal feeling to prevent any misunderstanding.

The interests of one individual are often opposed to the interests of another. The interests of a number of individuals belonging to the same class can, to some extent, be opposed to the interests of the

rest. According to the well-recognized principle, "The greatest happiness of the greatest number," the interest of the class must be subordinate to that of the mass, *i.e.* the general public; yet it has sometimes happened that the power of a class was so well organized that for a long time the interests of the minority predominated those of the majority.

We find this condition where a certain class has been long enough in power to make the laws of the country. Laws are the crystallization of customs. Laws become obsolete when the customs to which they owe their existence are changed. Laws are "mummies" when they are not in accord with customs and with what is right. Bloody revolutions were often necessary to change laws. Therefore, the particular kind of laws called dental legislation is a serious matter. In my opinion, state dental laws should only be made under the inspiration of the desire for public welfare and not under the influence of class interests.

This is something not to be forgotten at a time when dental legislation endeavors to keep up with the advance in dental science, and with the above in mind, allow me to ask you the following question: What do you consider the true value of dental legislation, and what may the public expect from it? This question, to my mind, has yet to be satisfactorily answered, and is the excuse for presenting a paper before this honorable body.

In the case before us of the public interest *vs.* dental legislation, allow me to introduce as the principal factor making for ill "professional egotism," a spirit related to self-preservation of the class on one side and professional jealousy on the other.

[The author here quoted largely from his paper published elsewhere, entitled "The Interest of the Dentist *vs.* the Interest of the Public."]

That this feeling is more or less common to all lands was illustrated in a conversation bearing on educational matters I lately had with a dental professor in Europe. In replying to a doubt expressed by me as to the advisability of the bachelor's degree and the official medical studies, and the detriment they might work in debarring many from entering the school and in denying the blessings of dentistry to the masses, he remarked, jokingly, "Oh, we don't need any more dentists here."

After this I hope to be understood when I repeat professional egotism is an ill-natured feeling related on one side to the self-preservation of the class and on the other to professional jealousy. This potent inner prompting becomes highly active in times and places where attacks are to be feared by competition, in the same way as wars are brought about by collision of the interests of nations.

Now, some of you may ask, "Why all this talk about self-preservation and professional egotism where only a few of the better dentists are interested in legislation and men who are subject to the instincts mentioned have no influence whatever upon the laws?

In my opinion, however, every dentist, even the dental-parlor man, has his influence upon legislatures, simply by feeling public opinion, without the sanction of which no legislation is possible. The man in the street has more influence, indirect though it may be, on legislation than the legislator himself, who depends upon his constituents for information.

Self-aggrandizement, among the many factors affecting dental legislation, is the most subtle and delicate and the more dangerous because it appeals to men of the highest type. In dentistry possibly more than in other professional life there exists the desire to reach the unobtainable. Many of us have "arrived" and have all that money can buy, only to feel keen disappointment at the lack of public recognition granted so freely to medical men. Therefore the hue and cry, "Raise the profession!"

Human nature is very complex; "Know thyself" is an axiom portentous to all who think—and who is to judge as between those who place self-aggrandizement or the public welfare first? But of one thing we are assured; no other individual motive is acceptable and no other growth will more truly raise the profes-

sion than that fixed in the solid groundwork of the public weal. When the appeal of self-aggrandizement is heard in the forming of dental statutes it is well for the legislators to be hypercritical.

If it occurs that the profession as a body, limited in motive power and handicapped on the way to a high ideal by its class instincts, "fathers" all dental legislation, the question What may the public expect from such legislation? becomes a very serious one. For this statement and to show that it is not exaggerated, I bring forward the following proofs—one from the new world and one from the old world:

"Much of our (American) legislation owes its existence to the effort of those who make the protection of the dental practitioner against the competition of his unqualified neighbor the primary and leading motive."*

In France there exists the condition of affairs that debars any foreigner from practicing his art, no matter from what reputable school he comes or how many years of reputable practice he may have, but compels him to pass through all the preliminaries and to spend at least two years in the local dental school, after which he may appear before the state dental examiners.

Nietche, the German philosopher, in his "Die Wille zur Macht" tells us that the main desire of man is power, and we have an illustration of this in the damage done by high-handed class legislation found in a bit of history of the healing art in Germany. When the all-powerful guilds or trade corporations of which the surgeons were one, passed regulations, limitations, and laws unbearable, there resulted a healthy reaction, and the "Gewerbefreiheit," or trade freedom, in Bismarck's time, was established, granting freedom in the healing art, which of course includes dentistry.

Is it merely accidental that about the time when this law originated the forementioned philosophical thought came also to the surface again? Possibly not. And I am well informed that not only the German, but many men of today still preach to the "Almighty" and not to the "Alrighty."

In this modest effort, seeking first and always the truth, if I have been rather hard on our profession and its youthful progeny, dental legislation, I must be forgiven, in the desire that many may rise in its defense; otherwise I shall do so myself.

* E. C. Kirk, "The Unification of State Dental Legislation."—*Items of Interest*, vol. xxi, p. 109.

THIRD DAY—WEDNESDAY, AUGUST 31.

The Chairman called the section to order at 2.30 P.M., and called upon Dr. Finley for his paper, entitled "Some Thoughts on Legislation."

Dr. M. F. FINLEY, Washington, D. C., then read the following paper:

SOME THOUGHTS ON LEGISLATION.

Legislation is as necessary in the control of professions as it is in the control of society. There are dishonest and evil-minded individuals who, gaining access through a little learning to the threshold of a profession, work incalculable injury to the progress of ethical or honest procedures, and make dark spots on the shield of honor of those callings. Honesty, in its most comprehensive meaning, is the prerequisite to a proper fulfilment of the career of an individual hoping to enter the profession of dentistry, if he desires to escape the pressure of some legal restraint upon the boundaries of his desires. Honesty—take its synonyms integrity, probity, uprightness, trustiness, faithfulness, honor, justice, fairness, candor, plain dealing, veracity, each of these adds a shade of meaning to honesty, which should enter into the make-up of the character of an ideal dentist. Why should we speak of ideals? They are necessary to a proper working out of standards in the make-up of what shall eventually control men in their relations with their fellow-men. The function of colleges is to disseminate knowledge, but with that knowledge should be imparted as much wisdom as possible. "A little learning

is a dangerous thing," "And with all thy getting get understanding," were never more genuinely true and applicable than in our own professional work. Dr. Angell, president of the University of Michigan, in his recent baccalaureate address to the classes going out from that institution, differentiated between knowledge and wisdom as follows: "By knowledge, I mean the possession by the mind of facts and principles, scientific, historical, philosophical, literary—an acquaintance with ideas, the perception of truths. By wisdom, I mean the power and the disposition to make a right and effective use of our faculties and our knowledge, a happy adaptation of ourselves and our resources to our circumstances. Knowledge may be regarded as the sum of our intellectual attainments. Wisdom has an intellectual, but also a moral element. It not only measures our relations to our environment, but with a high purpose and pure spirit and discreet temper adjusts our personality to our surroundings to secure the largest result."

The test of the impartation, reception, and assimilation of knowledge by examination conducted by others than those who give instruction is the wisest control of the fitness of the individual for entrance upon professional work.

Open and clear manifestation that knowledge has been acquired should be given. For instance, evidence of proper preliminary qualifications to enter upon the study of dentistry should be shown in the use of proper words, properly spelled, when the candidate for practice answers questions in an examination. A lack of that ability should be a disqualifying point in such examination. The test of acquisition of knowledge upon the subject of sterilization, which is but cleanliness carried to its finality, should be manifest in the appearance of the individual as he presents himself ready for operation in the mouths of patients. Unclean linen and, far worse, hands and finger-nails indicating the failure to use soap and water and nail-cleaners, show a disqualifying point to be seriously considered. Instruments, however carefully sterilized, in such hands are dangerous, for the infection is quickly transferred to them. More illustrations might be given, but I hope you grasp my meaning in this effort to establish a principle that is essential for those who expect to make a success in the practice of this profession, that each step should be thoroughly and honestly taken, that at no time carelessness or laxity may be charged or that any departure may be taken from the straight and narrow path. Make each operation an ideal one. Get in the habit at the threshold of the profession of being honest and faithful.

The aim of associated effort, such as we are gathered here for this week, is to elevate the profession by elevating the individual, but how slow almost to stagnation will be that upward progress unless more care be exercised than is used today in receiving material into schools for the purpose of molding it into professional character and ability. This condition of affairs is clearly manifest in the work of examining boards whose efforts are conscientious. Having been engaged in such service, these lamentable conditions have been forcibly presented to me.

Again, the effort now being made by the National Dental Association through its committee, supported by educational institutions, to secure dental positions in the army and navy on a basis of commissioned rank, is about to be consummated, in that the authorities of those two departments have agreed to this demand, which gives us an ideal basis upon which to stand. This gives us an opportunity of placing our men beside the men of other professions under government control and inspection on an equal foundation, and that they will not suffer in comparison is the hope and belief of us all.

Quoting from the remarks of a distinguished professor, "We hear much in our day about selfishness or self-seeking *versus* altruism; of individualism *versus* socialism—as if these words stood for opposing tendencies between which it was necessary to make a choice. Our moralists preach the duty of self-sacrifice, and while they mean the right thing, they sometimes seem to imply that it is a

man's duty to sacrifice his real self, his happiness and welfare to the demands of a mysterious but terribly insistent corporation called Society, as if we were somehow required by the eternal power that makes for righteousness to be continually taking bitter pills for the good of mankind at large. But this is not so. The work that we do as social beings, the work that we will do in the conscientious pursuit of our chosen vocation, or in the furtherance of any good cause that may commend itself to our judgment, does not come under the head of self-sacrifice, but of self-realization. And just in proportion as we do it reluctantly, and with a feeling that we are really sacrificing ourselves, will it be apt to be ineffectual as social service. What is called self-sacrifice is taking sides with the wider social self against the narrower material self.

When a gentleman gives his seat to a lady, he does not sacrifice himself—let us hope—but takes the part of his chivalrous social self against the old Adam. He does not do the thing for her sake, but for his own, though he probably has an illusion to the contrary. His act makes him "feel better," feel more of a man; and if it did not, he would not do it.

Now ethical merit is the progressive realization of the social self, the substitution of the higher, that is, wider tribunal for those of petty jurisdiction.

To bring about a consummation such as is desired and such as I have tried to indicate, would be somewhat more easy if the colleges engaged in giving instruction were upon a financial foundation which would place them beyond the necessity of depending upon the fees of matriculates. If our philanthropists in and out of the profession will lend their efforts to this millennial ideal, we may hope to see such a consummation within our generation. Failing in this makes the necessity for such broad laws in every state as are now on the statute-books of the state of New York, and the conscientious carrying out of the spirit of those laws by those entrusted with their enforcement, not for the purpose of crushing the weak necessarily, but by letting it be thoroughly known what are the requirements, what is expected, so that those who have any doubt of their ability or determination to succeed will be deterred from making the attempt lest they cannot fulfill the ultimate purpose of approaching near enough to an ideal to become good practitioners.

On motion, discussion of the foregoing paper was postponed until after the reading of the paper by Dr. D. F. Keefe, Providence, R. I., entitled "Reciprocity," which paper was then read.

The Chairman. We have a distinguished member of the section present from Canada—from Montreal—who will kindly read us a paper entitled "Dental Laws and Educational Methods in Canada." With your permission, we will ask the gentleman to read his paper, and as it is practically along the same lines as those of Drs. Finley and Keefe, we will discuss the three together. I take great pleasure in introducing to you Dr. Dubeau of Montreal, who will now read his paper, entitled "Dental Laws and Education in Canada."

Dr. Eudore Dubeau, Montreal, Canada, then read his paper, as follows:

Dental Laws and Education in Canada.

Canada, with a population of five million, is divided into seven provinces, each having its dental law, viz, Ontario, Quebec, New Brunswick, Nova Scotia, British Columbia, Prince Edward Island, Manitoba, and the Northwest Territories. Only two provinces have dental colleges, Ontario and Quebec.

Ontario has a fine college, well equipped, giving a dental education to one hundred and fifty students annually. It is affiliated with Toronto University, and is known as the Royal College of Dental Surgeons of Ontario. Trinity University also gives a dental degree to students presenting credentials showing that they have completed a dental course in a reputable college.

The province of Quebec has two dental colleges, the Laval University Dental School, where the tuition is given in

French, and the Dental Department of McGill University, where the course is given in English. Those two schools, though established this year, have practically existed for eleven years, as they are the continuation of the Dental College of the Province of Quebec, which was established in 1893, giving lectures both in French and English.

The course in the Province of Quebec extends over a period of four years, and we are going to keep it as it is, notwithstanding the action of other colleges. Moreover, a student unsuccessful in his final examination at the Laval School is obliged to take a fifth year in order to present himself for the degree of D.D.S.

McGill University gives the degree of M.D.S. at the end of the course, and the degree of D.D.S. on presentation of a thesis after a year's practice or more. As to the length of the course in Toronto, I am not in a position to say whether the course will remain at four years or be reduced to three.

As I have said before, the other provinces have no dental colleges. British Columbia, Prince Edward Island, Manitoba, and the Northwest Territories accept for examination to practice graduates from reputable dental colleges. New Brunswick and Nova Scotia do the same, but in addition require a matriculation examination.

In the province of Quebec, a student who intends to practice there must previously pass the matriculation examination, which is very high, and subsequently take the whole course.

Two years ago the Canadian Dental Association was established. It comprises the dentists of the whole Dominion of Canada, and its object is to create a council which would issue a license giving the right to its owner to practice all over Canada. The second meeting of this association will be held in Toronto next week.

As far as discipline is concerned Quebec and Ontario have the two best laws. In the province of Quebec a law was passed four years ago to prevent a dentist from advertising more than his name, address, and profession, the space for such advertisement being limited to twenty lines. A dentist who does not pay his annual tax to the dental association, after a sixty days' notice, is suspended from practice, and sued for illegal practice if he disregards his suspension. We have had much trouble in obtaining such a law and in putting it into effect, but we have succeeded. Until yesterday I thought we were the only province prohibiting advertisements, but I was informed that Ontario has the same power, and is actually gradually enforcing it.

I wish that all the other provinces, states, and countries of the world would follow this example, and then quackery would have seen its good days.

I should have liked to go more into details, but lack of time has not permitted me to do so.

Now as to reciprocity, if you will allow me to say a few words. Personally, my *confrères,* I am disposed to exchange with any province, state or country which has privileges as large as we have. Our examination is pretty good. Our examination is one in science and letters, and in order to pass the applicant must obtain sixty per cent. on each subject. Personally I would like to see my country meet with other countries with high privileges.

A paper by Dr. H. G. Patterson, Boisé City, Idaho, entitled "Right Legislation a Blessing to All Mankind," was read by the secretary.

A paper by George Habeeb Arbeely of Damascus, Syria, entitled "Needs of Dental Legislation in Syria," was submitted to the section, and read by title. The paper here follows:

The Need of Dental Legislation in Syria.

Gentlemen, I have the honor to address you as a member of your great body and as the first and the only Syrian dentist in the state of New York. I am glad to be given the opportunity to speak to you of the need of a law to enforce the study of dental surgery in the schools of Syria.

I take it for granted that every member of the Fourth International Dental Congress will be interested in glancing at the methods in use in the old country.

But before giving details, I would call attention to the fact that however limited may be the Syrian's knowledge of dentistry, his ignorance cannot be attributed either to lack of intellect or to lack of good-will.

These oriental people are intelligent, quick to seize ideas, and athirst for learning; and all that they need is freedom to study and to assimilate instruction. It is the Turkish Empire that alone is to blame. It alone is responsible for the fact that there is no Turkish law making the study of dental surgery compulsory.

Syria lacks American and European skill because she is absolutely ignorant of American and European methods. The medical board of Constantinople does not know that to neglect dentistry is to neglect an important branch of medicine. In countries like Turkey, where climatic conditions militate against close and active application to delicate details, a law is needed to protect the people against the charlatan. Nothing but law can enforce the study required as a precautionary measure. Thousands upon thousands of the people of the East suffer from diseases of the teeth and jaws, yet no medical man of Syria has drawn from that all-too-evident fact the inference impelling him to suggest the need of schools where would-be dentists can learn how to treat diseases of the teeth.

In Syria, the dentist *as a dentist* can do but two things; he can pull teeth and make rubber plates. Generally speaking, the Mohammedan sacrifices his teeth at the first hint of pain. His tooth may be flawless—no matter—let a nerve tingle, and out comes the tooth! In Syria the men who make a business of "dentistry" are the barbers. I call them barber-surgeons (or surgeon-barbers) because they are authorized to employ dry and wet cups for bloodletting, to vaccinate, to blister, to use means for the generation and production of an issue, or pus, by them considered useful for the accomplishment of certain results accessory to the peculiar practice of the so-called dentists of that far-off land. These barber-surgeons make use of two instruments in their treatment of teeth: a key-forceps, and a stout string or thread; but they extract teeth with the first tool that comes to hand, be it clean or unclean. If it is clean, so much the better. If it is unclean—if it engenders disease—so much the worse for the patient. Cases of blood-poisoning and cases of fractured jaws are of daily occurrence. The doctors report them, and the board of health pigeonholes the record. I need not call attention to the fact that the pigeonhole is a universal product, in evidence in Syria as in the more advanced West.

The oriental knows the uses of anesthetics; when he is to have a tooth pulled he benumbs his senses with spirituous liquor, and being drunk and incapable of indicating the afflicted tooth, he leaves it to the dentist to take his choice. The operator applies a string or forceps haphazard, now and then uprooting a good tooth, and leaving the bad tooth hard at work at the old stand. I remember such a case. A man had a pain in his upper right first molar. He went to the dentist, who extracted three lower teeth, and the patient went home. Soon after he returned, still in agony. The dentist made a search and found the tooth—but too late. Inflammation had set in, in both jaws. The dentist declared that there was but one way out of the affair. "Have them all out!" said he; "The way is simple, but it is sure! When your teeth are all out they cannot ache, or if they *do* ache, you will not know it!"

A barber's fee for extractions is from two to ten cents per tooth. In some cases barbers extract the teeth of their customers free of charge. Some of the men authorized to pull and fill teeth were watchmakers and jewelers before they became dentists. They call themselves dentists, and it is supposed in Syria that they are graduates from European colleges. These men give a tooth a summary treatment and then crowd into it either ce-

ment or amalgam. They know nothing of the anatomy or the pathological conditions of the jaws; therefore it cannot be said that they have ever properly "filled" a tooth. When a tooth aches after the cement or amalgam has been put in its cavity, the dentist's action is simple—he extracts the tooth, cement and all.

Gold as a filling is not used. Crown and bridge work are not known in Syria. Prosthetic work is limited to the making of rubber plates; plaster of Paris is not used. The only material used in taking impressions is a molding compound. In Syria, before a dentist succeeds in taking one impression the victim is forced to enter the chair from three to five different and distinct times. The plate thus acquired is rough, of oppressive weight, so sharply edged as to bruise the tongue, or so ill-fitting that its use is painful. I have known men and women who having provided themselves with such plates, carried them in their pockets, to avoid the torture attendant upon an attempt to carry them in their mouths.

In Syria, dentists' charges for extraction range from five to twenty-five cents (approximately). Fillings cost from fifty cents to one dollar (approximately). Rubber plates, upper and lower, cost from five to twenty dollars (approximately). The tools handled by the dentists are of the ancient form. Patients are treated seated in barbers' chairs, or chairs with movable head-rests. Not long ago I received a letter from a man in Damascus who wished me to buy a chair for his Syrian office. The chair was to be of the most approved and improved American pattern. He impressed it upon me that I was to buy him the best chair in the market, and he warned me not to pay more than thirty-five dollars for it. His plan was to open an office just opposite the office of the man in whose office he had learned his art. His ambition was to start out on the most advanced American plan. I answered that my time—the time required for his commission—would cost more than the amount offered by him for a chair; and I told him that the chair used by American barbers costs considerably more than the outlay that he had projected. I cite this incident to show how little the dentist of Syria knows of modern dentistry, or of the cost of modern American instruments. It is easy to become a dentist in Turkey, for in that country there is no law compelling a man to study his art before he practices it. I have known young men who having studied a short time in dentists' offices, decorated their rooms with gilded signs like those used in our dental parlors. In Syria, any man possessing physical force enough to draw a tooth out of a human jaw is free to set himself up as a dentist, and thereafter "to make or to mar" as occasion offers.

The Turkish government will forward an official authorization to practice dental surgery to any man who will pay from three to five dollars (approximately) for such "diploma."

Now, gentlemen, if you consider the points advanced in this paper, you must conclude that the dentistry of Syria demands a law enforcing the education of men who aspire to fit the Syrian jaw for the work apportioned to it by nature's laws. I believe that the medical colleges of Syria would welcome the admission of so important a branch of the science of medicine. It is beyond question that all serious thinkers would acclaim a law to enforce the study of dental surgery, as obviously important for the public good.

The Turkish government alone has power to make such a law. A year ago a Syrian paper of New York reported in "Kaukab" that his Majesty the Sultan was about to compel all dentists to show their diplomas in the county clerks' offices of the towns in which they exercised their professions; but that order, if confirmed, did not take effect.

There are one hundred and fifty thousand Syrians scattered over the United States, and there are seven Arabic newspapers in New York and Boston. All these people and all the men who represent the Arabic newspapers are in favor of the establishment of schools of dentistry in the mother country. I know that the editors of the Syrian journals would

be glad to publish translations of any suggestions or instructions bearing upon this matter.

A paper by Dr. JOHN H. COYLE, Thomasville, Ga., entitled "Higher Preliminary Education," was presented to the section and read by title.

The CHAIRMAN. It seems to me that we have covered the ground pretty thoroughly. As there are no other papers before the section, if it is your pleasure I would suggest that we adjourn. I feel that we are working in the right direction, and really believe the work of our section will be productive of great good. I thank you, gentlemen, for your presence and attention, and I now declare Section X of the Fourth International Dental Congress adjourned *sine die*.

NEW YORK ODONTOLOGICAL SOCIETY.

Anniversary Meeting, January 1905.

THE thirty-eighth annual meeting of the New York Odontological Society was held January 17, 1905, at the Academy of Medicine, 17 West Forty-third street, New York city.

Afternoon Session.

The clinics and demonstrations began at 1 P.M., and continued until 5.

CLINICS AND DEMONSTRATIONS.

1. Dr. JOHN EGBERT NYMAN, Chicago, gave a chair clinic showing his methods of cavity preparation for porcelain inlays; he also showed baking of the same.

2. Dr. EDWARD B. SPAULDING, Detroit, demonstrated the making of the porcelain jacket crown. A detailed description of this can be found in the *Items of Interest* for June 1904.

3. Dr. H. W. HARDY, Boston, assisted by Mr. Tucker, gave a chair clinic showing the Jenkins porcelain crown. The procedure is as follows: Grind down root to level of gum, then polish. Slightly countersink over canal of largest root and take impression with sticky-wax for plaster cast. Make die and counter-die of Melotte's metal and strike up No. 31 gage iridio-platinum plate to cover end of prepared root. Fit heavy iridio-platinum pin into hole prepared in strongest root, as long and strong as root will permit, allowing it to project through plate. Solder in position with pure gold. Take impression and bite. Select an Ash tooth of the desired color, grind to suit bite, and solder to projecting pin with pure gold. Then you have an absolutely rigid base and framework on which to build up any desired occlusion of the Jenkins prosthetic body, and you are also absolutely sure of your color in the Ash facing.

4. Dr. G. W. SCHWARTZ, Chicago, showed the details of porcelain bridge construction. These bridges were removable and consisted of a lower clasp denture, showing a clasp constructed to fit a porcelain crown with a lingual backing of platinum, grooved mesially and distally—its advantage being in appearance, and security when in place. Also a removable two-tooth bridge with one abutment only, the abutment to clasp and telescope both. The advantage of the telescope clasp is that it prevents the anterior end of the bridge from sagging.

5. Dr. ROBERT T. MOFFATT, Boston, showed a method of carving porcelain teeth and crowns out of the crude porcelain clay. The demonstration was on models of practical cases. He also showed specimens of carved teeth, including some that had had actual service in the mouth. The packing of the body on the models and carving the same, and the

putting on of the enamel, were the essential features.

6. Dr. D. Everett Taylor, New York, demonstrated the making of gold inlays used especially in producing esthetic bridge attachments, as well as a durable plug for large cavities. The following gives the general scheme:

After cavity has been prepared, take impression in dental lac (Ash & Sons). From this impression make a model in oxyphosphate cement. Burnish gold plate (24-k.) No. 33 or 34 gage into cavity in cement cast, using great care and annealing frequently. Trim matrix to within one-sixty-fourth of an inch of cavity margin and reburnish. With this gold matrix in place on cast, pack gum camphor into it until exaggerated contour is produced. Carve this rough camphor contour with a sharp knife until natural contour is reproduced. Over this carved camphor contour, burnish a piece of the same gold used in forming matrix, viz, 24-k. No. 33 or 34 gage, annealing this piece frequently to keep it very soft. When this outside piece covering camphor contour is in perfect adaptation, remove top piece and trim margins to the margins of the matrix which has already been trimmed; replace top piece and reburnish. If possible, at this stage place the piece of work thus far complete in cavity of tooth for a final burnishing. Upon removing, the operator will find these pieces holding together perfectly, simply by the fit, if the work is properly done. The next step is to hold the pieces gently in the fingers and cut with engine-bit a hole through the matrix, *not* the top piece. (Doing this leaves the hole on inside or under side of finished inlay.) The size of the hole is to be proportioned to the size of the inlay—use judgment. Approximately the area of the hole should be one-quarter size the area of inner side of matrix. Now you have two pieces of gold forming a box, with a hole through one side, and filled with camphor gum. Grasp the double margin of gold with lock pliers, place a drop of alcohol in the hole, and ignite. The camphor will immediately burn out, leaving this gold box absolutely clean on the inside. Through the hole drop pieces of solder, and solder in Bunsen flame or blowpipe. Be sure that solder flows over the entire inner surface to sufficient thickness to insure the inlay against collapse. It is not necessary to completely fill it with the solder. Use 20-k. or 22-k. solder; 20-k. plate is preferable. Replace on cast and disk off gold margins until inlay is flush with cavity margin. In using emery disks revolve disk away from the gold; it leaves a finer edge. Polish and set with oxyphosphate, or in some cases gutta-percha cement. If the inlay be partially hollow, fill the inside with setting medium. The claims made for this method in making a gold inlay as compared with the "building up" method are—less time, less contraction of metal, no investment, and no laborious grinding away of surplus metal, also absence of pitted surface which sometimes happens in sweating.

7. Dr. Ned A. Stanley, New Bedford, showed a simple and practical porcelain crown for molars, the essential features of which are as follows: After the roots have been carefully treated and filled, the pulp-chamber and any cavity extending below the gingival margin may be filled with amalgam, and the tooth trimmed to the gum line. This surface can be concave, convex, or flat, according to length of bite. Drill two or three parallel holes large enough to receive a No. 15 or 18 gage platinum wire. Burnish a piece of platinum plate No. 32 gage to this surface. Pressure with a ball burnisher will indicate position of holes on plate. Solder the wires going through this plate with pure gold. Then—with pins in position—reburnish and mallet if necessary the plate to the surface of the tooth. The platinum can now be trimmed to the exact size of the tooth and brought to a knife edge at the circumference if desired. Adjust pins to length of bite, leaving a free space for the porcelain. The bite is now taken, and from the articulation you have an accurate model from which to carve and bake the tooth,

which is of course fused to the platinum. The contraction of the porcelain may cause the opposite ends of the pins to spread a little, but if pure platinum is used they can be bent to the original position. The result is an artistic crown with no possible chance of irritating the surrounding tissues, and the mechanism is so simple and reliable that it is within easy grasp of every operator.

8. Dr. W. Melvin Whitlock, New York, showed some unique methods in porcelain inlay work, one of which was the removal of the matrix from the cavity by a blast of air from the chip-blower.

9. Dr. W. B. Dills, Brooklyn, gave a demonstration of the methods and uses of Jenkins' inlay and prosthetic porcelain.

10. Dr. Walter S. Waterbury, New York, gave a clinic in porcelain inlay work and showed an instrument which he had devised for taking impressions of labial cavities with gutta-percha, when for any reason it was inadvisable to make the matrix direct from the tooth.

11. Dr. W. A. Capon, Philadelphia, reports his clinic as follows:

Until the advent of porcelain as a means of restoring teeth the dentist was at a loss to repair in an artistic and acceptable manner the broken tips and corners that are frequently presented to every practitioner. An operation for the restoration of a broken incisor tip, requiring for a successful issue a combination of mechanical and artistic skill, can be performed as follows:

The edges of enamel are trimmed perfectly square and sharp, and no instrument is better for this purpose when possible than a square-edged stone. Then cut a groove in the dentin between enamel plates sufficiently deep to allow insertion of a wire loop or staple. In living teeth this cutting is generally painful, but this can be avoided by using ethyl chlorid spray, which is the most positive means of overcoming sensitive dentin in the anterior portion of the mouth. After the groove or cavity is made the required depth, platinum foil of the usual inlay thickness is burnished over the prepared surface and into the aperture as far as it will go, which is very little. Then bend iridio-platinum wire gage No. 24 in the form of a loop, with ends serrated and made flat for greater attachment to porcelain. The matrix and wire are adjusted upon the tooth, the ends of the latter toward cutting edge, and while in position porcelain is applied in form of thick paste made by mixing with gum tragacanth or starch. The most convenient form is that which is called Ash & Sons' mixing liquid. The excess moisture is withdrawn by applying blotting or bibulous paper to the porcelain. Carefully remove from the tooth and fuse. This gives an accurate adaptation without investing or soldering.

The next step is to place the partly finished work in position and burnish the edges to place and note general requirements of contour, position, etc., and refusing until the operation is satisfactory. This form is recommended in preference to a reversal of the loop, but where the pulp is too near the cavity surface for safety the latter is preferred.

Loops or staples of this kind are preferable to pins because of easy adaptation and surety of position while under manipulation. The same directions are applied to corners and for the restoration of any other teeth.

I have many operations of this class doing excellent service after ten, twelve, and fourteen years and have no hesitation in saying that its durability is unquestionable.

12. Dr. Henry McManus, Hartford, gave an interesting clinic on porcelain inlay filling for a labio-cervical cavity, showing the advantage of his method of placing the first layer of the body along the edge of the matrix, leaving it depressed in the center so that any shrinkage would be away from that point. The results were very satisfactory.

13. Dr. Fred E. Smith, Philadelphia, showed a porcelain crown with band.

Select Logan crown, adjust it as to length. Prepare root as for Richmond, make band of thin-gage platinum; put pin of Logan through it while on root and carefully withdraw. Add high-fusing porcelain, covering joint and exterior of band, and bake. When complete it will have the appearance of an all-porcelain crown.

14. Dr. Lionel M. Homburger, New York, showed the making of a large porcelain restoration in non-vital teeth with pin attachment. Prepare the root-canal as for pivot crown, the cavity in the tooth to be prepared as usual for porcelain. Make a hole through the platinum matrix, and through this pass a platinum pin, wound with platinum, into the pulp-canal; withdraw all together and invest and bake the inlay. The pin can then be withdrawn, leaving the platinum foil which enveloped it in the inlay. This can be removed with a round bur, and the whole set as in a Davis crown.

15. Dr. Geo. Evans, New York, showed the making of gold inlays, using platinized gold plate and moss fiber gold; the idea being to pack the gold matrix loosely with moss fiber gold and then solidify it by flowing it with gold solder from a Bunsen flame. The results were very satisfactory.

Evening Session.

The meeting was called to order by the president, Dr. John I. Hart. The reading of the minutes of the last meeting was dispensed with.

The President. It is our privilege to have with us tonight as our guest and essayist, a gentleman who has traveled over a thousand miles to be with us—a gentleman whom we admire as a teacher, and whom we respect as a dentist. I have great pleasure in introducing Dr. John Egbert Nyman of Chicago.

Dr. Nyman then read his paper, entitled "Porcelain Problems." [This paper is printed at page 1166 of the present issue of the Dental Cosmos.]

Discussion.

The President. Our essayist has requested that Drs. Perry, Gillett, Ottolengui, and Schwartz be invited to discuss this paper. I have great pleasure in calling on Dr. S. G. Perry of New York to open the discussion.

Dr. Perry. There is such a sweet reasonableness about this paper that it is beyond criticism; it is almost beyond discussion.

Dr. Nyman has read rapidly, as was necessary to finish so long a paper, and he has given us fact after fact in such quick succession as to leave one almost in a state of confusion, and therefore unable to attempt at this time anything like a clear or comprehensive discussion of the paper.

The fact that impresses me most is its conservatism. To those who know the work which Dr. Nyman has done heretofore in the field of operative dentistry, as shown by the papers he has written and the work he has done, it is clearly evident that what he states tonight comes with the highest authority, and you will notice first of all that it is in no sense theoretical, but absolutely practical.

I will mention only one or two points which struck me very forcibly while the paper was being read.

Dr. Nyman does not say that he burnishes the platinum or gold into the cavity alone, but he tells us that he sometimes makes matrices from impressions. This is an evidence of his level head; because while there can be no reproduction of the natural tooth that would be quite as perfect as the tooth itself into which to burnish the platinum or gold, at the same time we are practicing dentists, not theorists, and we have to consider the time, and our patients, and the environments, and we cannot always do the thing which is absolutely best. I have found that very many times impressions can be taken of the cavity and the work delegated to a man in the laboratory, and results produced which may or may not always be best; still, results can be attained which are practical, and which are reasonably accurate, and it is

very helpful in practice to have many of the operations performed in that way.

As we know, some of the practitioners in porcelain tell us that the platinum or gold should always be burnished in the tooth. I cannot do that between certain of the front teeth. I cannot do that always with cavities which are under the gum on the labial surface of the incisors. I have found by considerable experience that that process which produces the best results is filling the cavity with the red impression material and finishing it as if it were a filling; burnishing it down perfectly smooth on the edges, sandpapering sometimes if on an approximal surface, and then taking it out on the point of a fine instrument, and handing it over to the man in the laboratory. He sets it in plaster—the finer grades which are now used for that purpose—sets it in so that it is just even at the edge, and after the plaster has become thoroughly hard, he boils it in stearin, which hardens and strengthens it. Into this he burnishes the platinum or gold, whichever is used, and then bakes the inlay in that and brings it to me in a finished condition. That I think operates very well in the front teeth where the cavity lies under the gum. I believe Dr. Nyman did not mention that method, although it has been spoken of before. Perhaps he does not consider it of enough importance; but I have set a great many of these inlays without causing the slightest flow of blood by doing it in that way.

Another feature which shows how perfectly reasonable Dr. Nyman is in the adequacy of his method, is shown by the manner in which he uses the opaque substance at the bottom of the cavity, and it was very gratifying to me that he made the subject so clear. I have no doubt that we shall benefit by following that more closely than we have in the past.

Dr. Nyman is a little bold in the preparation of his cavities, but it is that daring which is justified by the confidence which he has in making a perfect joint and fixing his inlay so that it will be secure. I should be afraid that I could not make such a perfect joint as he is able to. I should try, if I could, to get a little bit under the tooth and hide my operation by not sacrificing a particle more of that tooth than I could help.

That is the only criticism that I could make on the whole paper, and I have no words to express the admiration I feel for the manner in which he has put before us this great array of facts. We shall have to spend a long time when the paper is in print to fully appreciate it.

Now, gentlemen, one word in reference to porcelain in general. Is it not a fact that porcelain has come to stay? Is it worth while to spend any more time opposing a system which is so clearly to our advantage as this one, and which is so firmly established? Do not let us put anything in the way of that progression. Do not let us waste time discussing such questions. Let us promptly accept the system, and not lose a moment in perfecting ourselves in it to the utmost of our ability.

Dr. R. Ottolengui, New York. It is a great pleasure for me to be called on to discuss Dr. Nyman's paper. I had the honor of reading a paper on the same subject in Chicago two years ago, and Dr. Nyman discussed it. He said at that time that there was a great deal of language in my paper, but very few facts. Now there is *some* language in Dr. Nyman's paper, and it surprised me to find how many facts there are in it.

In the first place, I want to take exception to the statement that porcelain should not be used on the occlusal surfaces. True, edges of porcelain are friable, and friable thin edges should not be made; but at the same time cavities in molars and bicuspids can be so shaped that the edges both of the enamel of the teeth and the porcelain will be strong. The extreme case which is illustrated here is rare. Such extensive overbite is seldom seen, and where it is seen it is even more rare that the occluding tooth bites so closely that weak margins would be left; but if there were such an occlusion it would be possible to cut off the cusp and restore it with porcelain.

It is true, as Dr. Nyman has said, that

the gold inlay has come to stay, and the gold inlay is preferable in these places if your patient will let you use it; but, gentlemen, let me tell you that this education of the public has gone on to such an extent that there are many people of refinement who will not permit you to put gold in their teeth. I have patients who beg and beg of me to take out small gold fillings in occlusal surfaces because they wish no gold to be seen when they laugh.

Now I want to come to this cavity preparation in Figs. 11 and 12. [See page 1173.]

You have heard him say tonight that while it looks like a ragged tear, it would be practically invisible. Of course, if a gentleman can make a joint as beautiful as that, he has a right to make his edges as ragged as he likes; but I will take one exception to that cavity formation. I do not like it on the labial surface. If you study the action of incisal occlusion, you will find that in the act of biting you hold food in your mouth and bite it off, and it is a lower tooth striking the filling on the lingual surface which dislodges the filling. The substance which you bite upon would rarely be resting on the incisal edge. It is consequently in my opinion necessary that you should preserve as much of the labial surface as possible. At the lingual aspect I form it much as the essayist has it, with all the steps giving you that mechanical resistance which the doctor advocates, at the same time preserving that labial plate.

We have heard and are constantly hearing of the differences between high- and low-fusing porcelain, and I have said before, and I say again, that I consider there are three kinds of porcelain on the market—the high-fusing, the low-fusing, and the Jenkins. Why do I say that? Dr. Jenkins has two bodies on the market, one of which is higher fusing than the other, and both are distinct from any other material on the market.

It is conceivable to me that that identical formula for porcelain which Dr. Nyman thinks is just right, and which will fuse at 2200°, can be prepared according to Dr. Jenkins' method and give a body which will fuse at 1900° and even lower.

One more word and I am done. Again we are told—and I am surprised that Dr. Nyman should tell it—the trouble about gold as a matrix is that you are obliged to invest it. You are *not* obliged to invest it. There is no matrix that Dr. Nyman will make with platinum and fuse a filling in without investment that I am not prepared to make with gold and manage without investment. It is not an essential. Again, alluding to the gold matrix, Dr. Nyman has told you of its warpage and various other troubles; and yet when he comes to speak of platinum as a matrix material he declares a hole is inevitable. I beg to state that provided your cavity is of proper shape, there is no necessity to have any tear or trouble whatever with your gold matrix; in fact, at the present time I consider a hole in my gold matrix an evidence that I have been careless in the work.

Dr. H. W. Gillett, Newport, R. I. The acme of diplomacy in the exercise of our daily work seems to me to have been touched in the description by Dr. Nyman of the procedures that are fitting when you are just finishing that porcelain inlay that looks so nice when you put it in, and ask the patient to look at it. I think that description is a gem, and it is well worth pasting over our porcelain benches for frequent reference.

Investigation of the conditions under which cement will develop its greatest strength, is most important; and I commend that point to your attention. I take some slight exception on the point Dr. Ottolengui mentioned—the incisal step [see Figs. 11 and 12, page 1173]. I do not quite like it. No doubt Dr. Nyman can handle it successfully, but personally I would shrink from it, and as an alternative suggestion I want to mention a plan I have put in practice once or twice.

Many of you are familiar with a procedure for the anchorage of a gold filling in a similar case, in which a dovetail is cut into the palatal surface of the incisor —so that while the anchorage is partly at the cervical wall, the main reliance is on

the extension running out into the palatal surface of the tooth. This procedure has been satisfactory in my own hands, but is deserving of mention at this moment only for the purpose of illustration.

To extend its applicability to the porcelain inlay, it is needful to make this extension first. If low-fusing body is to be used, that portion of the matrix extending into the palatal dovetail is filled with 24-karat gold fused with the blowpipe, Bunsen, or furnace, as preferred. If high-fusing body is to be used, the metallic extension is provided for by platinum solder in the part of the matrix occupying the dovetail.

Attachment between the porcelain and the metallic extension is provided for by a short piece of iridio-platinum wire placed in the matrix extension and projecting at an appropriate angle into the space to be occupied by the porcelain. Before it is finally attached, it may be retained by a bit of yellow ochre or "protection powder" mixed with water, occupying the place the porcelain is to occupy later.

The metallic extension should be built so as to favor good angles for the porcelain where the two join. The pin should be bent well toward the center of the porcelain, and lie as deep as feasible, so as not to weaken the porcelain. Gold or platinum foil may often be advantageously packed into the matrix extension while it is in the cavity. After the metallic part is made, the matrix is to be perfected, and the porcelain added as usual. Something similar has been previously reported.

Personally I have obtained a great deal of satisfaction by combining the two processes in the making of the matrix, just as Dr. Nyman has mentioned—the partial swaging of the matrix in a cement impression of the cavity, and its completion in the cavity itself.

Dr. Nyman's suggestion concerning the preparation of some shades which shall match the shades of the samples of porcelain teeth which the manufacturers give us, and with which we are so familiar, seems to me a valuable one. It is one which has been in my mind for a long time, and I trust now that it has come from so authoritative a source, we may be able to have something of the kind. I would welcome such shades.

Just a word about the use of the electric furnace for the low-fusing materials. I have obtained greater satisfaction in the fusing of the Jenkins material in the electric furnace by using a shield of asbestos in the top of the muffle. Take a piece of the asbestos that comes with the Hammond furnace for handling the hot muffle, cut off a piece of it just long enough to slip into the muffle when bent to the shape of its top and sides. Leave some air space between it and the muffle top. This imitates the conditions in the Jenkins gas furnace, and results in the application of the greater part of the heat from below. The Jenkins material fuses more satisfactorily if the heat is applied from below and it is allowed to settle—"squat," as one operator expressed it—in the matrix. Experiments have indicated that the same principle may be of value with the higher-fusing materials.

There is one furnace which has not been put on the market—Eimer's—which is built on that principle—*i.e.* the heat is all at the bottom of the muffle. Its walls are very smooth, and do not chip or crumble under the influence of heat.

Dr. F. T. Van Woert, Brooklyn. I am very much pleased with Dr. Nyman's paper, and particularly with the position he takes. I am sure that any members present who follow him in his deductions can hardly go astray.

Dr. Nyman has misquoted me in saying that I have abandoned the gold matrix for the platinum. The fact is I have abandoned the platinum for the gold; and am now using the Jenkins inlay material in preference to all others, with very great satisfaction.

It is impossible at this late hour to include the question of cavity preparation, and so I eliminate that from my remarks.

I wish particularly to speak of the different results obtained in the fusing of porcelain, in the one instance with as low a temperature as possible, and the

addition of time; and on the other hand by an increase of temperature and reduction of time.

I am confident the best results, as Dr. Nyman has stated, are to be obtained by the former method, not only from a color standpoint, but for strength and homogeneity. All of which is of decided advantage when the piece has to be ground and polished.

The question as to whether platinum is a better matrix for the fusing of porcelain seems to me of little importance, for the reason that we know of men all over the country who are obtaining most beautiful results with both. For instance, Dr. Head of Philadelphia uses platinum exclusively. Dr. Jenkins uses gold exclusively, and they both produce some of the most beautiful results that I have ever seen. I think from personal experience with both materials that it is a question of the individual rather than the material. I believe that the average operator can manipulate gold very much more easily and obtain better results with low fusing than with the high. One of the objections made to the use of gold is the necessity for its investment in some material, to prevent warpage. This seems to me hardly a consideration, as the time required with the proper pans or trays is so little that I think even the platinum would be better treated in a like manner.

I have here a little square platinum pan, which can be handled from any of its four corners, the bottom of which is perforated with a broken excavator, which gives it the appearance of a sieve. If the perforation is done by placing the pan on a piece of lead, and driving the excavator through it with a small hammer, it forms a bur or projection around each hole, so that when the asbestos paste is put in it and the matrix adjusted to position, it can be placed upon the hottest furnace without danger of blowing out the investment by the formation of steam.

It is generally conceded, I think, that exceedingly large porcelain fillings, in either the bicuspid or molars, are more difficult to make, because of the distortion of the matrix due to the pulling or drawing of so large a body of porcelain in fusing; and as the esthetic side of the question is largely eliminated from these fillings, it has been suggested by Dr. Bruck, instructor in the dental institute of the Royal University of Breslau, that the matrix be formed of No. 36 gold plate, and that the portion which comes in contact with the margins, and for a considerable distance below, be left upon the inlay. After the cement is thoroughly hardened, the surplus gold that overhangs the edges is to be cut off and the remaining gold burnished, so as to cover up the line of cement. The advantage of this method is that the matrix is so heavy that it will not pull in fusing the porcelain, and it makes a more perfect union between the inlay and tooth. I have found this method of great value, and many of you have seen fillings of this kind in the mouth of Dr. Dills.

There is one more point to which I want to call your attention—that of the etching of the under surface of inlays. I have lately discovered that after the inlay has been etched and thoroughly washed, dried, and laid aside for twenty-four hours, and then put in alcohol for four or five minutes and again dried, there will be found a heavy coating of soft white material, in appearance like chalk. This when scraped away with an instrument leaves a surface very different from that obtained when first etched. I am led to believe that many failures are due to this condition, which prevents the adhesion of cement to the under surface of the inlay. At any rate, I think it would be well for those using hydrofluoric acid to consider this, as they may save themselves some uncomfortable experience in the future.

Dr. G. W. Schwartz, Chicago, Ill. I cannot help taking exception to Dr. Ottolengui (as much as I admire and love him) on this point of molar and bicuspid fillings. Dr. Ottolengui speaks about cutting this off—grinding it down. He would have to grind a long way if he were going to remove enough to allow for the restoration of that form. I do not think men can take off a cusp and put one on as well as God ever did.

When I first began the burnishing of platinum matrices, I tried to make the metal just as thin as possible. I would roll the metal out as thin as I could, fold it and roll it through the mill again, and then fold it so that four thicknesses were rolled through. I do not do so now, for the reason that I do not get enough cement between the inlay and the cavity wall. I believe you must have a certain amount of cement between the cavity wall and the inlay to get the best results, and when the platinum is thinned down beyond a certain point, something is lost in the strength and adhesion of the cement to the cavity wall. The main thing is accuracy and simplicity. We want to lose all the machinery we can about dentistry; the simpler we get everything, the better can we do—the better men do we become.

As to high-fusing and low-fusing: I do not think there ought to be any controversy at all about that. They are both absolutely good. One man will work high-fusing all right, and another will work low-fusing. I learned the high-fusing method. In 1886 they used gold, platinum, and other metals burnished into cavities for fusing inlays, so it shows that gold was used at least twenty years ago. Since, I have learned the Jenkins method, and I have made some Jenkins inlays that were good, but I still cling to the idea that either method is good.

Now in regard to mixing colors. One man says you must not mix different shades. I can mix up the different bodies and get my colors. That is the way the manufacturer does. I do not think it follows that you must lay those on in layers. I think either one, high or low, can be mixed and baked without putting it on in layers.

The process of cementing, etc., and the adhesiveness of the cement, is different from that of a carpenter joining different kinds of wood. I believe if we could get more pressure on the cement than we do, we would have our cement set a little better.

As to swaging, one swages and one does not. In many instances I will swage part of it and bake it, and put it in the cavity and burnish the other part. Both plans are good; I would not want to do without either.

The testing of the bottles for inlay work: I do not think it is safe to take a bottle and see that it is the shade given, and then use from that bottle. If I want to be absolutely certain about the shade, I bake a sample out of each and paste that on the bottle; then I know what I have in that bottle. Sometimes these shades vary a little.

Dr. Taggart, who read a paper at the Fourth International Dental Congress, had a little roller burnisher. He proved that the ordinary burnisher scraped along; and instead, this rolled everything down, just like a rubber roller. If he ever gets these out, I know you will all have a set; I think he made them up for his own private use, but it is a clever little thing that would be useful to all.

Dr. Ottolengui. Mr. President, I just want to say a word. Dr. Schwartz criticized cutting off the cusp of a bicuspid. If there is any man on earth who could cut it off and restore it so that the Lord would not know it, it is Dr. Schwartz.

The President. There are many members and guests here whom we would be glad to hear from, but as the hour is late I shall call upon Dr. Nyman to close the discussion.

Dr. Nyman (closing the discussion). The gentlemen who have discussed my paper have been very gracious in their criticism, and I am glad to be able to note that in the particulars in which they have felt obliged to differ with me only the relatively exceptional and less important phases have been involved. Some of the criticism has been based on a misunderstanding, due to the fact that my paper unfortunately was of such length that I was obliged to read so rapidly that I did not make myself clear. This is evident in the criticism of the cavity preparation with an incisal step involving both labial and lingual walls, as depicted in Fig. 2. Critics will find that I advised such form of cavity preparation only "in those in-

cisors whose labial and lingual walls are in contact throughout the incisal third, with no septum of dentin, and which are without approximal contact with an adjacent tooth owing to the spacing of the teeth." There are exceptional cases which probably represent but one per cent. of the cases of approximo-incisal cavities that are presented in one's practice. Experience leads me to advocate this method in such cases. In a large percentage of the cases where the labial plate of enamel has been retained I have noticed that this labial plate split off after the inlay had been set.

I confess that my illustrations are somewhat exaggerated and lead one to infer that I advocate an extension of cavities that may justly be criticized. But I have found it advisable to both illustrate and clinically operate in a slightly exaggerated manner, that the essential features of a method may be so emphasized as to be plainly apparent. Once one has caught the essential features of a method, it is very easy for him to modify the method to individual cases. I believe that could I stand by the chairs of the gentlemen who have discussed my paper, or they by mine, day after day, there would be but little difference of opinion as to the preparation of the cavities presented.

These exaggerations will be eliminated in the illustrations when prepared for the publication of this paper.

Dr. Ottolengui made a statement that very much surprises me, *i.e.* that it is no more necessary to invest a gold matrix than one of platinum. I had always supposed an investment was essential, as gold is more pliable than platinum and the low-fusing bodies have greater shrinkage. I do not attempt to contradict him as I have not as yet attempted such a procedure. I fear he has not his practice under proper control if many of his patients will not permit him to put gold in their teeth. My patients permit me to put whatever I think best in their teeth or—they cease to be my patients.

Dr. Ottolengui says that molars and bicuspids such as I have depicted in cross-sectional drawings are extreme cases and rare. If his clinical experience leads him to that conclusion then I must say that there is a peculiar difference in average type between the molars and bicuspids of the East and those of the West. The type that I have drawn accurately represents that of the majority of those teeth that have come under my observation. I would it were otherwise, but such is the case. Cavity after cavity has presented itself, the preparation of which for a porcelain inlay with strong margins would have necessitated a cutting away of sound tooth-structure that I could not reconcile myself to.

In regard to giving Dr. Jenkins' porcelain a classification by itself, I would say that I am not able to distinguish between Jenkins' porcelain enamel and Brewster's gold-matrix porcelain after fusion, unless the piece have sharp contour, in which case Brewster's gold-matrix porcelain retains its carved shape a little more definitely.

I do not believe that Dr. Jenkins or anyone else can take a high-fusing porcelain and bring its fusing-point down to that of his enamel by a strictly refining process. There would have to be an addition of some substance that would materially alter the composition of the body. There can be no doubt that the manufacturers of high-fusing porcelain exercise every care to eliminate foreign non-essential substances from their preparations.

In regard to Dr. Gillett's suggestion for a dovetail step in the lingual surface midway between incisal and gingival points—my fears would be that such a step cut to sufficient depth for strength might come perilously close to the pulp. My experience in regard to fusing coincides with his. I think I get better results in the fusing of porcelain (of either high- or low-fusing variety) by means of the electric furnace than in any other way.

I regret that I made an incorrect statement to the effect that Dr. Van Woert had still made matrices of platinum instead of gold, although he had abandoned the high-fusing porcelain for Jenkins'

enamel. I based my statement on an item which came to my notice in a discussion published in one of the journals, the name and date of which I cannot recall. I am certain, however, that I am not in error in regard to Dr. Cudworth's practice.

I cannot share Dr. Van Woert's belief that the average man will obtain better results from a gold matrix and low-fusing porcelain than he will from a platinum matrix and a high-fusing porcelain. I have had considerable experience with both processes and I feel confident that I am correct when I state that the best results are obtained by the use of the two grades in conjunction. Everyone of experience who has studied these problems admits that each grade has distinctive merits which the other does not possess.

The little investment box that he exhibited is very ingenious, and I can readily see eliminates many of the annoying circumstances connected with investments. In regard to the setting of porcelain inlay with the gold matrix attached at the margin, I should expect to note a chipping of the porcelain from the matrix, as the bond of attachment between the porcelain and the gold matrix is rather weak; of course this chipping would not endanger the tooth-structure, and I think I should prefer such an inlay for the cavity he has shown than the regular porcelain inlay.

I am very glad that Dr. Van Woert brought out the point regarding the immersion of the inlay in alcohol after its treatment with hydrofluoric acid—this seems to increase the etching, and after the resultant powder has been removed (with a small mandrel brush in the handpiece under moderate speed) a surface is obtained to which cement adheres very strongly. This point escaped my attention in the preparation of the paper and was unintentionally omitted.

I am grateful to the members of this society for the patience with which they have borne a long address, and I appreciate the cordial reception they have given my paper.

The meeting then adjourned to the banquet hall, where a collation was served.

W. B. Dunning, D.D.S.,
Editor N. Y. Odont. Soc.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

Thirty-seventh Annual Meeting.

First Day—*Morning Session.*

The thirty-seventh annual meeting of the Dental Society of the State of New York was held in the assembly hall of the Hotel Ten Eyck, Albany, N. Y., May 12 and 13, 1905.

The meeting was called to order Friday morning, May 12th, at 10 o'clock, by the president, Dr. William Jarvie of Brooklyn.

Prayer was offered by Rev. Dr. Stephens of Albany.

The first order of business was the calling of the roll by the secretary, which on motion was dispensed with until a later session.

The next order of business was the reading of the minutes of the last meeting.

Dr. W. A. White of Phelps moved that the reading of the minutes of the last meeting be dispensed with on account of their having appeared in printed form in the Transactions. The motion was carried.

Dr. Jarvie then called the vice-president, Dr. W. A. White, to the chair, and read his annual address, as follows:

President's Address.

I desire to express my sincere appreciation of the honor conferred upon me one year ago, when to my great surprise, and during my absence across the seas, you unanimously elected me your president. On being notified of my election, my first impulse was to decline the honor, great as I esteemed it, but upon further reflection I decided that I would not be justified in shrinking from the duties and responsibilities which my old friends and comrades in the society had called me to assume.

I must congratulate the society on its flourishing condition. This is one of the most largely attended meetings it has ever held; its membership is larger than ever before, and there is a goodly balance in its treasury. During the year I have visited every district society in the state. In October it was my privilege to meet with the Sixth, Seventh and Eighth District Societies at Buffalo. In December I met with the First District Society at New York; during last month I met with the Fifth District Society at Syracuse, with the Fourth District Society at Schenectady, and with the Third District Society at Albany; while with my own district society, the Second, I have met several times during the winter.

All the district societies are strong, vigorous and active; the Fourth, which at one time was a feeble organization, requiring the fostering care of its parent and the kindly co-operation in its meetings of its neighbor the Third, is gaining materially in numbers and has a most intelligent and active membership.

Every district society is most flourishing, and I was most profoundly impressed by the refinement, education, general intelligence, and knowledge of the most up-to-date standards which generally pervade the profession throughout the state. The profession is thoroughly organized, and the law regulating the practice of dentistry is being well enforced, as you will learn through the report of the Law Committee.

It is rarely that a society with as large a membership as this adjourns for a year and comes together again with unbroken ranks. We are no exception to this general rule. Since we last met, one of our members has passed to that bourn from whence no traveler returns. Dr. H. G. Mirick of Brooklyn died December 22, 1904. He was one of the organizers of the society, was treasurer from 1883 to 1893, and up to his retirement from active practice was rarely absent from a meeting. The sentiments of the society upon this sad loss will be duly presented in the report of the Committee on Necrology.

Undoubtedly the civilization of mankind dates back to a much more remote period than has been generally understood. During my travels of last winter in Egypt and the Soudan I saw many evidences of a high civilization which existed five, six, and seven thousand years ago. The people of that time were versed in the arts and sciences to a degree that is most surprising. Buildings erected nearly six thousand years ago are yet in a good state of preservation, and it would require the best efforts of the ablest architects and engineers of the present day to duplicate these structures. In fact, some of these old temples still serve as models for our architects when designing buildings in which strength, as well as grace and beauty, is desired to be indicated.

At Luxor I saw a mummy between six and seven thousand years old. The body, in a perfect state of preservation, was in a reclining position on the left side and not bandaged or wrapped as are the mummies of a more recent date, but had cloths about the abdomen and loins. This proves that the Egyptians of that time not only understood the art of weaving, but that they had as good, if not a better knowledge of antiseptics and how to prevent decomposition or putrefaction of the human body than have we of the present time.

That dentistry was practiced by them is positively indicated by a painting which it was my privilege to see upon the walls of the tomb of Rekhmere, who was vizier under Thutmosis III and Amenophis III, kings who reigned about 3500

years ago. While I have no knowledge of any proof that the Egyptians practiced the art of filling teeth, I have seen two human incisor teeth set on a band of gold, the ends of which were attached to the canines, somewhat after the fashion of the modern bridge. This appliance was taken from the mouth of a mummy which is in the museum at Liverpool, England.

The knowledge of this high early civilization became hidden from us. The science and art of the ancient Egyptians became lost arts. Practically all knowledge of dentistry was lost, and until about one hundred and twenty years ago the art was restricted to extraction of the teeth, their restoration by artificial substitutes of various kinds, the transplantation of teeth, some slight treatment of the gums, and the filling of decayed teeth with lead.

The first mention of gold as a filling material is made by John Arculanus, whose book was published in Venice in 1542. Arculanus died in 1484, so that his book must have been written previous to this latter date. It is again mentioned as a material for filling, although by an anonymous writer, in a book entitled "Arzney Buchlein," published in Leipzig in 1530, although the use of gold for this purpose was not generally known until about the year 1800.*

But it is during the past fifty years that the greatest progress has been made in our profession in restoring with gold broken and decayed teeth. Frequently it was said that progress in our art in the line of saving such teeth had reached its climax, as the use of gold for this purpose had become an exact science. Just at this juncture, when further progress in this direction seemed impossible, porcelain made its advent, and with this material, in addition to restoring to their original form and usefulness decayed and broken teeth, they can be restored to their original beauty of appearance also. So will it ever be: when apparently we have reached the limit of the possibilities, new avenues of progress and advancement are opened to our view, and advances will be made in our art and science which shall make the knowledge of today seem in the light of the future to be but the densest ignorance.

This rapid progress in our art has been due very largely, and I might say with truthfulness almost entirely, to dental associations, among which the Dental Society of the State of New York, ever since its incorporation in 1868 under the second law regulating the practice of dentistry ever enacted in the United States, has played a very important and influential part. Prior to this time there were but few dental schools, and many of the prominent and most able dentists had received their instruction and early experience in the offices of private preceptors. In order that such men might receive a degree after proper examination, in 1870 the dental law was amended, providing for a Board of Censors and the conferring by this society of the degree of M.D.S., Master of Dental Surgery.

In 1879 this society again took the initiative in causing an act to be passed requiring every dentist then in practice within the state to register within sixty days, and permitting no one thereafter to begin the practice of dentistry without having a dental or medical degree. In 1895, through the influence of this society, the law regulating the practice of dentistry was again amended so that the Board of Censors became the Board of Dental Examiners, and no person was allowed to commence the practice of dentistry unless he had received a license from the regents of the University upon the recommendation of the examining board. The board was allowed to examine only those who had received a degree from a registered dental school, or who had been practicing legally in some other state for at least five years. The amendment also required the dental schools in this state to exact in 1898 an education equivalent to one year in a high school three years before graduation, in 1899 an education equivalent to two years in a high school, and in 1900 an education

*I am indebted to Professor Edward C. Kirk for these data, the books being in his collection.—W. J.

equivalent to a full high-school course. In 1899 an interchange of licenses to practice dentistry was effected between New Jersey and New York, by which dentists who had been licensed to practice in this state would be licensed to practice in New Jersey without further examination, and *vice versa,* those who had been licensed in New Jersey would be licensed to practice in New York without further examination. This was the first case in which such an interchange in medicine or dentistry was practiced, and although for a short time this agreement was interrupted, I am happy to say that it has been resumed, and an interchange with Pennsylvania also is in effectual operation.

It has seemed to some of our members who have always been interested and active in the steps taken in this state to advance the interests and standards of the profession, that the Dental Society of the State of New York is ready for another step in the march of progress.

In every country there are some men so devoted to their art or science that their entire time, talents, and energies are given up to the work of original research in the direction in which they may be especially interested. These men are content if the financial result be barely sufficient to procure for themselves a most modest subsistence, being amply repaid and feeling rich indeed if they succeed in adding to the knowledge of science or accomplishing something which may lead to the amelioration of the condition of their fellow man. To such the recognition and appreciation of the value of their efforts and the pronounced sympathy of their associates in their own profession would tend greatly to encourage them to continue in the field of scientific research, when otherwise discouragement and discontinuance of effort would prevent the accomplishment of results which might be the means of producing the most beneficent results upon mankind. In our own profession there are those who have devoted years to the investigation of various subjects, with results which have added much to our knowledge and which assist us in ministering to and overcoming the lesions which lie within our province to treat. To recognize the work of such and to encourage the investigation of others, I would recommend that a committee of five be appointed which shall report to the society the names of those who, in its judgment, have contributed results of original research, or of those whose high attainments and professional careers have been of such a character as to have materially advanced the science and art of dentistry; those thus recommended to be awarded a gold medal of appropriate design and inscription and be elected Fellows of the Dental Society of the State of New York.

I would also suggest that the first year the committee recommend the names of three gentlemen to be elected as Fellows, and each year thereafter but one.

If this recommendation be approved by you, I shall esteem it an honor to be allowed to donate to the society one thousand dollars, to be known as the "William Jarvie Gold Medal Fund," the interest of which shall be used to purchase the medals.

The program for the meeting is most attractive, and I am sure it will prove most valuable, instructive, and helpful. Its influence will be felt not only by those who are in attendance, but by the entire dental world who are reached through the publication of our proceedings. The papers to be presented treat of a wide range of subjects and are by some of the ablest men in the profession. For the first time in our history, clinics have been made a prominent feature of our meeting, and judging from the eminent men who are to conduct them they cannot fail to interest and instruct. To the gentlemen from other states who have so kindly come to assist with papers, clinics, and discussions, I offer our most heartfelt thanks, and tender a most cordial welcome.

I cannot close this address without expressing my hearty appreciation of all the kindnesses and courtesies I have received during the past year. Whatever of success may attend this meeting will be due to the ready co-operation with which my efforts have been seconded, not

only by the members of this society, but also by its many friends who abound throughout the ranks of the leaders in the profession in all parts of the country. I have had but to express a wish, and if it was among the possibilities it was granted at once.

Discussion.

Dr. S. G. Perry, New York. This very forceful and comprehensive address of our president, it seems to me, should be accorded special consideration. Dr. Jarvie has made an original and I think a very important suggestion in the formation of a fund for the purpose stated, and I deem it proper that this society should appoint a special committee to consider the address and recommendations contained therein.

Dr. R. H. Hofheinz, Rochester. I move that such committee be appointed and that it consist of three members of the society.

The motion was carried, and Dr. White appointed as the committee on the president's address Drs. S. G. Perry, New York; R. Ottolengui, New York; and R. H. Hofheinz, Rochester.

Dr. R. Ottolengui, New York. Regardless of what the committee may do, I move that the society extend a vote of thanks to Dr. Jarvie for his generous offer of one thousand dollars for the fund.

The motion was carried.

The President. It is my pleasure, gentlemen, at this time to present to you one who is known wherever dentistry is known. No man in the dental profession is more favorably known than he, and no man is more dearly beloved by his friends than Professor E. T. Darby of Philadelphia, who will read a paper entitled "A Field for Women in Dental Practice."

Dr. Darby then read his paper. [Printed in full in the September issue of the Cosmos, at page 1063.]

Discussion.

Dr. Waldo E. Boardman, Boston, Mass. I believe that women should have the requisite assistance to aid them in their education and in gaining a livelihood later in life. There will always be women who must earn a living, and I am not one who believes in keeping them from any honorable occupation suited to their tastes, whether temperamental or otherwise. Let them choose any occupation and there will always be found some who will not succeed, whether it be in dentistry or in other spheres of activity; and the same is true of men. In the case of either sex the fittest will succeed, while the others will drift to their proper sphere in life.

I well know that there is a great prejudice existing against women entering any line of business in which men are engaged, especially in the professions. In New England, of which I am better qualified to speak, women have been successful in the ministry, in law, medicine, and dentistry. In my own state, Massachusetts, we have today in our state society a total active membership of four hundred and sixty-seven, and of this number eleven are women, graduates of several dental colleges, all in the active practice of their profession and apparently doing well—that is, earning a comfortable living. There have been others, but they have since married and retired from practice.

I believe with the essayist that the advent of women in the profession does not seem to be on the increase. While I do not see how it is possible at present to educate women in dentistry separately from men, yet I think the system as at present carried on is pernicious, for it leads to many complications, not necessary here to enumerate, through the mingling of the sexes in the dental or the medical colleges. Women should be educated in separate colleges from men. We all know that the growing tendency is for separate schools for women, and so it should be, especially in medicine and dentistry.

It is not my belief that, in the long run, the average woman who enters dentistry will succeed in the sense that the man does. She has not the physical stamina to withstand the fatiguing work

at the chair; neither has she the aptitude toward mechanics as has man, who for generations has received the training to fit him for the various occupations in which he is engaged. Likewise this same training must be given to women through generations before she is able to grasp the qualities inherent in man for the practice of dentistry, with the chances greatly against her, although now and then there will rise some woman of exceptional ability in all lines.

To my mind, woman's true sphere in life is motherhood and home, but there are so many more female infants over males born who survive infancy and reach adult life that the surplus must be provided for outside of domestic service, hence she turns for a competence to occupations which seem to be more easily and quickly acquired than in occupation with domestic affairs.

The replies from the schools addressed by Dr. Darby do not conclusively settle anything with relation to women in dentistry. It would be interesting to learn from the schools that answered in the affirmative the question "Do you find them better students than men?" and the same answer applies to the other questions asked—do the schools who answer in the affirmative have more females than those who answer in the negative? This might give us a better clue to these questions as answered.

I have recently conversed with several physician friends, and find that they all agree that women in medicine are not a success; and they further assert that a good trained nurse is far preferable in hospital work to a regularly graduated woman physician; that she knows more—has more sense as to what is required of her, while the woman physician is usually too timid and does not grasp the situation as quickly as the nurse who is without a degree though she has been specially trained.

As to how women compare with men in dentistry, I am not now prepared to state; nevertheless, as I said in opening my remarks, I am in favor of women trying to improve their condition in life in the matter of a livelihood, into whatever channel they may desire, and sooner or later they will find their true level, as does man.

Dr. S. G. PERRY, New York. Certainly we must accept woman in the profession of dentistry. We would not be so unchivalrous as to deny her the privilege of working with us. I think it is a part of her nature to work for us. As stated in the paper, I do not for a moment believe she is naturally fitted to take full charge and full responsibility of a full practice. I think she is eminently fitted to be a man's helper in the dental office as in the home. I believe she is well fitted to be an assistant, as indicated by the essayist. I was one of the first, years ago, to employ a woman as a secretary and general assistant in my office. I think Dr. A. C. Hawes and Dr. Bogue preceded me by a short time, but from that time to the present I have always employed a woman assistant in my office. We should not expect for a moment that a woman's employment should be that of a trained family dentist, to do the laborious work of the office, but her duties should be the caring for and looking after the patients, caring for the children—and that is strictly and properly within the province of her proper work. When it comes to taking charge of a full practice, and taking all the responsibilities attendant thereon, and doing hard work, she is not fitted for the task. In fact, I doubt if the time will ever come when she will really rival us in our work. If we want to take a selfish view of the question, we need never fear having to consider her as a rival in our work. But we will never acquire a more competent assistant than we will get through some high-minded, helpful, earnest woman, whose heart is in the work and whose nature it is to comfort and to help. I have had much satisfaction in the women I have employed, and I leave my practice in their charge when I go abroad for the summer or to the country, and I have always felt that my interests would be well cared for. It is a part of her nature to do that sort of thing, and do it well.

Now, just one word from the woman's standpoint. I do not believe that women

are well fitted for the great and serious work of the world. There is, however, an excess of them, and of course they must be provided for and there must be some place for them to work out their salvation for themselves, and I am glad to see so many avenues opened to them throughout the world. We know that the world is changing, and we must look to the future for precedents in this line. I do not think women well fitted for any independent serious work, for this reason: When a young man starts out in life, at sixteen, eighteen, or twenty-five years, he selects a calling and does so in dead earnest. He knows distinctly that his success will depend upon the singleness of purpose with which he follows the work to the end of his life. He has no other thought, no other ambition, than to make a success. It is not so with women starting out in life. The idea of marriage is always in her mind, and no matter how earnest she is in the work in which she is engaged, it is always with the feeling that some day she will meet her affinity and then her life must change. And you will observe that women who undertake any serious work generally do so after thirty, thirty-five, or forty years of age, when that blush of youth and hope she has of marriage has passed away. Take any of these young women who attend colleges, either medical or dental, or in any other training schools, and you will find that they are always inspired with that fond hope. Now, any person starting out in a profession with that feeling could never take hold with the firmness of the person who has one single hope and knows that that will hold to the end. And it seems to me that that handicaps her in her race with man. Yet we must give her an opportunity, and I believe her best opportunity will be in the lighter work. I think the time is coming when every man in practice will employ women assistants far more than at the present time. I do not think that all women should be thoroughly trained in dental education for the above reasons. I think some could take the responsibilities of full practice and be equal to the occasion, but as a rule they are not fitted to do so. They have the intuitive sense but not the quality of judgment that men have; and if there is one calling on the face of the earth that demands good judgment it is that of dentistry. I would not put medicine or surgery ahead of dentistry in that respect, and these qualities will be found, in my judgment, in men in greater degree than in women.

Dr. M. F. Finley, Washington, D. C. As an historical production this is a valuable paper, as are all emanations from the pen and brain of the distinguished author of this contribution to dental literature.

My sympathies are all with the sentiment expressed in this paper—granting women all opportunities to fill positions for which they can qualify themselves, and as well lending them encouragement and assistance to that end. Being an alumnus from a university which is coeducational in all its courses of study, and which has furnished as many shining examples of successful fulfilment of positions of responsibility in the professions by her women graduates as any other educational institution in the land, my loyalty to that institution would be poorly fulfilled did I not thus support that grand idea of equal rights for the sexes. The author has given credit to one of the women graduates of the University of Michigan, the institution referred to, Dr. Vida A. Latham, who needs no added commendation from me—her work in dentistry speaks for itself. A woman graduate in medicine from that same university made it possible for the president of that great university, Dr. James B. Angell, to consummate a special treaty with China—he having been appointed to a diplomatic position by the President of the United States—through the fact that she, by her medical skill having ingratiated herself into the confidence of the Emperor of China and his family, was enabled to give him such an introduction as she alone could give under the circumstances, and then he by his great skill completed and confirmed this same confidence in the direction of his mission. The question of whether the field for

women in dental practice should be limited to that of dental nurse, I am not fully prepared to accept at this present time. Or perhaps a better way to express it would be to encourage the sentiment in the direction of such usefulness where less preparation would meet the requirements than would be the case for the full practice of dentistry.

The essayist did not give the percentages of success in the case of men practitioners. How many continue in practice—or successful practice? Such a table would be valuable in making comparisons between the sexes, and I doubt not the figures given in this paper for women would be approximated by the percentages for men.

One of the strongest points in the paper in favor of women is the admitted fact as to their being able to perform operations with the infliction of less pain. Men might take example from them with advantage to themselves and their patients. Gentleness and consideration for the feelings of those who submit themselves to us for operations are very essential to a true fulfilment of the ideals of a successful dental practice.

I congratulate Dr. Darby on having presented this subject in such a masterly way, and this convention on being able to get him to do it.

Dr. F. W. Low, Buffalo. Mr. President and gentlemen: Those who know me best know that I am as wax in the hands of woman, and today I appear before you merely as the cylinder of a graphophone. I have come not to make a talk myself but to present some notes made upon the essay by a woman. I was determined that this convention should listen to the woman's point of view. And I would ask you, Mr. President, why was not a woman appointed to open the discussion on this paper? Is it not because there are no women members in the society?

The PRESIDENT. Yes, one.

Dr. LOW. Only one, and she gets her membership through the district society. Now, gentlemen, what happens when a woman makes application to a dental society for membership. I will tell you what happened in Buffalo in a case of this kind. A certain woman applied for membership to the city society. There was no question as to her morality or ability; she had a fairly good practice (we never expect many women to shine at the top of the profession). She was finally elected a member of the society, but not until she knew that a respectable minority in that society did not want her there. Now, what is the result? She pays her annual dues but never comes near the meetings, and she lacks what every woman lacks in our profession, the opportunity for post-graduate privileges gained through membership in societies, and I want any member of this society to go away from this place, if he has ever harbored a purpose to cast a "woman hater" black ball, *ashamed to let any woman know that he was so small, mean, and prejudiced that he would not extend to her every privilege for post-graduate advancement.* Now I have said all that I want to say for myself, but I want to read a few notes made on this paper by a young woman who has been in practice not more than a year. She has read the paper and appreciated it very much, and has much admiration for the essayist, although she has not known Dr. Darby as I have had the privilege of knowing him, and I can assure you that there is no animosity in what she says.

(1) "Isolated professionally." Dental societies are for the advancement of the profession through its members. A woman's dental education ceases with her diploma so far as any benefits derived from association are concerned. Where have men gained their best and broadest knowledge—the three years they spent in college, or through association with societies and other professional men? If you sow sweet-pea seeds in your garden, and then leave them to struggle up alone and they bear but indifferent blossoms, are you justified in claiming that that particular kind of seed will never produce perfect flowers? To be sure, when the first slip appeared you didn't exactly put a brick on it.

(2) "No addition to dental science." Can as big a crop of roses be expected

from six bushes in New York state, even granting that they are properly cared for, as from the immense gardens of southern California? Isn't there something in atmosphere, both physical and otherwise?

(3) "Men or women the better students?" Most schools grant that women are better students, but some stick on the fact that they are "more faithful, but lack intellectual capacity." What does a family more good, one small sack filled with flour, or a bin with a capacity for tons? There is capacity and capacity.

"The use of an organ determines its strength." Men have been educated from time immemorial; women for three or four generations. The great engineer, Civilization, has worked in a man's brain for centuries and turned out a very good piece of work. He began on woman's seventy-five years ago, and the result hasn't been half bad in proportion to the other. At that rate, fifty years more ought to accomplish things.

(4) "Withstand fatigue." Many saleswomen after standing from eight in the morning to six in the evening, go home and make their shirtwaists, and often all their clothing. How many men after working that length of time, go home and do anything similar? Do not both men and women rust out quicker than wear out? A woman may look more fatigued. While in college a woman may go without luncheon and stand over the chair all the afternoon and go to the lecture at five o'clock, but let a man have only fifteen minutes for lunch, and the same work for the afternoon, and there's no lecture for him at five; he has worked enough for one day; he is justified in leaving. Possibly these little things are not known to the faculties of colleges. A faculty keeps its eyes on students in decided things, but are not little personal details more apt to be known just among the students? The question is "fatigue of a long operation." How can a faculty, or even a demonstrator, decide about the fatigue of a single operation? A man student may be fatigued or not, according to the amount of time spent at the corner the night before.

(5) "One graduate to two hundred." Such a difference puts anything like average out of the question. The schools that have graduated a hundred might be the ones to claim that women are equal in operative and prosthetic work, while the schools that have graduated one may say they are not.

(6) "Few examples not sufficient." Are not the examples, in proportion to women practitioners, as great as are the examples of marked mechanical ability in proportion to the number of men practitioners?

(7) "Sympathetic nature saves the patient at the expense of thoroughness." When to spare the rod was to spoil the child, a mother told her small spank-worthy son that she loved him while she administered the chastisement. His father whipped without saying anything about love. Ask the small boy if his mother spared him pain at the expense of thoroughness.

Dr. R. H. Hofheinz. I wish to discuss a few of the questions that Dr. Darby has presented to dental teachers for consideration, and answer them from the standpoint of a teacher.

The first one was—Do you find women as good or better students than men? I would say that in the University of Buffalo, as a rule, the women students have been among those who have passed the best didactic examinations; they have been the best attendants, and for that reason have become true students. The next question—Does the average woman student do as good work in operative dentistry as the man? I hesitate to answer this, because my experience has been that the average woman student has not been as good an operator as the man; but I do not attribute that entirely to her lack of manual dexterity. I think it is due a great deal to her natural timidity, and I believe if women could have the advantages of a post-graduate course, as Dr. Low suggested, they would probably become as good operators as we have among men. The next question—Does the average woman student seem to be able to withstand the fatigue incident to dental operations? I have never found, as a rule, that it was so much a question of physi-

cal endurance with the woman. In comparative relation to man she may not have the physical endurance, yet at that time her ambition is greater than that of the man, and that will supplement her possible deficiency in physical make-up.

Women certainly possess certain qualifications which make them particularly fitted to enter the field of dentistry. I would say here, however, that there must be a decided line of demarkation between the graduated D.D.S. and the "dental nurse" of which Dr. Rhein spoke last year, because I believe—and I think that was Dr. Rhein's intimation—that the maximum amount of work the dental nurse should do in a dental office, aside from the general clerical work, is that of the prophylactic care of the mouth, also baking inlays, together with the general help she can give the operator at the chair. There is a vast difference between that and the woman D.D.S. I believe the special future of the woman D.D.S. will lie in the care of children's teeth. Whilst it may seem a paradox, yet it is a fact that some operators, after reaching a certain standard in practice and a certain age, develop an amount of irritability —which more or less comes with both— that makes them not as well fitted to take care of children as women are. I think in that particular field women will have sufficient latitude to practice our specialty. It is not a question of the usurpation of the prerogative of man or the supplanting of men in the profession; the entrance of women in this field will be of great benefit to the profession and to patients and will supplement the work of men.

Dr. John I. Hart, New York. The subject as outlined by Dr. Darby presents to us many facets, each one of which might be taken up to advantage separately. Dr. Perry states that he does not think women are qualified to take charge of a large *clientèle*. Admitting that, we must also admit that many men are not qualified to take charge of a large *clientèle*. Many women possess the attributes which should make them successful dentists. They have a sympathetic nature, and can easily develop sufficient mechanical ability to carry out all that is required in dentistry with the modern equipments that every office should have. It is true that very few women possess executive ability to take care of a large practice, but it is not essential that all should be as successful as some. The field has been entered by women, and in my estimation women will qualify themselves better when special colleges take up instruction of women students.

Dr. M. L. Rhein, New York. Professor Darby did me the honor of quoting some views of mine on the subject, and I believe he has placed a somewhat erroneous interpretation on my paper in that he seems to think that I limited the sphere of woman's usefulness in dentistry to the prophylactic care of the mouth. I agree thoroughly with the conclusions that he has reached in the paper, and the reason that I framed my remarks in the manner I did was not for the purpose of limiting woman's usefulness simply to that feature, but to emphasize the fact that in a very large dental practice there was sufficient work necessary in that particular field to engage the unlimited time of a qualified competent assistant. I thoroughly emphasized the fact and brought it out in my paper that the peculiar training which woman has inherited from the domestic work—from her needle, from her various other forms of manual dexterity—especially fits her for becoming a valuable assistant in everything that pertains to the artistic work we do in dentistry, and in nothing is this better exemplified than in porcelain work, where delicate shading comes into play. In dentistry there are very few who accomplish much that brings us to the top unless we specialize in some particular form of work, and in that respect the remarks of almost everyone who has spoken here coincide with the idea that woman is especially fitted for dentistry if she specializes in some individual direction. This is in accord with the view so generally expressed that there are only a limited number found in practice who are not weak in executive ability, and the remainder would have a better field in dentistry as helpers. I am in entire sympathy with the views brought out by

Dr. Low that it is impossible for us to give any just estimation of woman's possible sphere in dentistry until we have given her the proper opportunity to show her real value.

Dr. DARBY (closing the discussion). Mr. President, I recognize just what you do—that the hour is growing late and a great deal of time has already been devoted to the paper; therefore I will say nothing more on the subject.

Dr. C. W. STAINTON then read a paper on "Our State Society: A Study and an Appeal."

After the ensuing discussion, on motion the subject was passed, and the meeting adjourned until afternoon at 2 o'clock.

FIRST DAY—*Afternoon Session.*

The meeting was called to order at 2.30 by the president, Dr. Wm. Jarvie.

The PRESIDENT. It gives me great pleasure to introduce to you one of our honored practitioners, and one fully competent to talk upon the subject of which he is to treat, "Dentistry of Today"—Dr. S. G. PERRY of New York.

[This paper was printed in the issue of the COSMOS for July, at page 795.]

Discussion.

Dr. E. T. DARBY, Philadelphia. I think there is very little in that paper that I could discuss, but there is much in it to commend. Dr. Perry has gone over, in the few minutes that he has spoken, the history of the dental profession from its beginning to the present time, and fifty years into the future. He has given us a very comprehensive paper. The opportunity of looking over the paper was given me before it was read, and I was impressed with the amount of history and the amount of practical common sense that it contained. Just consider for a moment the progress that has been made in dentistry during the past fifty years—I need not go back more than fifty years. There are those here who remember dental practice as it was fifty years ago. They have watched its progress from that time until the present, and what a history it has been! Look, for instance, at the mechanical appliances which have been introduced; the antiseptic treatment of disease; the artistic sense which has been developed, and the beautiful results which are obtained. No other profession has made such advancement, and I should be glad if I could live fifty years longer to see the progress that will be made in another half-century. There are those who are disposed to belittle our work and narrow our sphere of usefulness, but I am disposed to magnify our calling and bespeak for it a place among the noble professions. Who can question the benefit which the dental profession is daily rendering to the world, and who can predict the increasing benefit which fifty years will bring forth?

Dr. R. H. HOFHEINZ, Rochester. I am glad to disagree with Dr. Perry on some small points in his paper. He says that the real value of porcelain fillings will not be known until many years have passed. If porcelain be destined to take a permanent place in dentistry, which it certainly will, I think there will be no generation in a better position to appreciate the meaning and application of porcelain work to dentistry than the present one, which has labored so hard over contour work, and therefore is in a better position to appreciate the wonderful amount of relief that porcelain has brought to the present generation.

The essayist has put contour work in the most important place in dentistry today. I should give systematic prophylaxis of the oral cavity the first place in dentistry today. I do not mean prophylaxis as practiced by the average dentist, but the prophylaxis to which Dr. Perry alluded toward the end of his paper—prophylaxis which compels the patient to come to the dentist and be under constant and systematic care, which means practical immunity of the teeth against the ravages of decay.

Contour work certainly does take the second place, if not the first, and I do believe that if it had not been for the use of the Perry separator, contour work would not have developed to its present phenomenal degree.

I agree with Dr. Perry in his philosophy of tooth-filling, and in my teachings I hold that there is only one material which is best adapted at any one time for any given cavity. It makes very little difference whether the material be gold, cotton, porcelain, etc., it should be used at the proper time and in the proper place; but it takes a long time before a man has reached that mature state of calm intellectuality in which he can select the right thing for the right place.

It is the display of dexterity of which the essayist speaks that may have led us to our present high standing. The display of dexterity is largely a question of ambition, and without ambition we might probably never have had the same advancement.

The eulogy which the essayist has bestowed on gutta-percha I think well applied. If there be any one material that is equally safe in the hands of the superior operator and the botch, it is gutta-percha. The inferior operator can do less harm with it than with anything else. Among the oxyphosphates the essayist has not mentioned copper oxyphosphate. I believe that it is one of the most valuable additions to the plastic fillings of today. It takes the highest rank, next to copper amalgam, as an antiseptic filling, and as such has a place among materials without which we could not well get along.

The gentleman who said that within the past fifty years the amalgam question had not progressed has not studied the question very well. I do not know of any other material, excepting porcelain, which has had so much scientific thought applied upon it as amalgam. If it were not for the thorough understanding of the physical properties of amalgam it would be impossible for many of us to do today that which in former years only a few could perform. The profession is everlastingly indebted to Dr. Black for this scientific accomplishment.

Tin does not give the new generation as much joy as the older men. In a great many instances students come to the teacher and ask why they should use tin if amalgam will answer the purpose as well and better. That question is hard to answer. In my practice tin holds a much higher place at the gingival margins of large approximal cavities of posterior teeth than any other material in operative dentistry.

I fully share the enthusiasm which Dr. Perry expressed in speaking of porcelain. I have taken pains, in a paper read before the Second District Society, to show the relative permanence of gold and porcelain; and after looking over the subject very carefully I am not convinced that porcelain will fill quite as many places as the porcelain enthusiast wishes us to believe. Gold will after all hold the scepter of permanence for a great many years over a number of cavities which are being filled today with porcelain. We must remember, however, that the porcelain art is young, and if we consider what enormous advancement we have already made, it is not surprising if we should be led to unbounded enthusiasm over this material.

Among scientific discoveries there is nothing which compares with the discovery of Dr. Miller of Berlin, of the micro-organisms of the mouth and their relation to tooth-decay. But for the establishment of that scientific fact a great many of the other achievements affecting the oral cavity would have been impossible, and a great many could never have been correctly obtained.

I was much pleased to hear Dr. Perry speak of colleges and education, and if time were not too limited I should like to dwell on that part of the paper particularly. In a paper read before the Academy of Stomatology of Philadelphia I have advocated an increased specialized preliminary education for the dentist of the future. If it be necessary for a profession like ours to specialize and subspecialize, it is certainly necessary for the men who come into the profession to have a specialized preliminary education to get the proper attitude of mind before they decide to become dentists. I am happy to say that after 1906, in the state of New York, matriculates will have to have a regents' count of forty-eight points to enter the dental colleges. That

means a quality of knowledge of which we should be proud, and the men who enter dentistry under that law will greatly add to that high standard of education that the profession so sorely needs, and on which the essayist has dwelt so eloquently.

Dr. JOHN I. HART, New York. Dr. Perry in his paper seemed to indicate that dentistry was more for the classes than for the masses, and that is the only point in the paper with which I take issue. I think that owing to the environments and the life led formerly, we can largely account for dentistry not being so necessary. Surely we in our clinics see the effects of differences in environment. We see people coming to the clinics who up to three years previous did not have dental troubles, but on account of the change of their environments they have to seek the clinics. You change the environments and you change the condition of the mouth. And so the complex mode of living has necessarily created the most capable dentists, who are practicing today and performing operations that formerly could not be performed.

Dr. V. H. JACKSON, New York. I was pleased to hear Dr. Perry's reference to the value of amalgam and gutta-percha as filling materials. I encourage the use of gold in my practice, but I recognize the fact that there is a place for gutta-percha and amalgam, and I think Dr. Perry is justified in appealing to the young men of the profession to use these materials where they are best applied. Several years ago I was called upon to treat some cases where there were very large gold fillings in the bicuspid teeth, in which I used amalgam to stop decay at the gingival border. Recently I examined these cases, and the amalgam apparently had served the purpose better than any other material would have done.

With regard to the discoloration of amalgam, we have amalgams at present that do not tarnish and stain the dentin as formerly, and it is a great boon to the dentist, and especially for the patient who is unable to pay for large gold fillings.

In regard to the regulation of teeth, it has been my life-work to simplify methods and adopt apparatus that would accomplish work without discomfort to the patient. Until a few years ago physicians were often advising patients that they were not in condition to undergo an operation for the regulation of their teeth, but I am happy to say that that day is passing, and with the new methods no especial discomfort is necessary.

Dr. PERRY (closing the discussion). Mr. President, I do not think it necessary to continue the discussion, and I have only a few words to say. I am rather staggered at the reception of the paper. I am certainly surprised that it should have been received in this flattering way. I appreciate very much the criticisms that have been made. They have opened up new vistas to me, and I can see where the paper could have been strengthened, and now I am sure that my apology in the beginning was in order. Dr. Hofheinz made allusion to Dr. Miller, and that reminds me of an omission in the paper to refer to his valuable work, and I would apologize to Dr. Miller for not mentioning what he has done in the matter of the solution of the question of caries of the teeth, and I am grateful to Dr. Hofheinz for alluding to it. It only shows how careful we should be to try to do just what is right in the writing of a paper.

The PRESIDENT. It would seem to me that this is the time of all times to have a paper with reference to porcelain fillings. I am therefore going to take it upon myself to change the order, and call for the paper by Dr. R. OTTOLENGUI, New York, on "The Retention of Porcelain Corners."

[This paper was printed in the issue of the DENTAL COSMOS for September, at page 1057.]

Discussion.

Dr. JOSEPH HEAD, Philadelphia. I do not at all agree with the essayist. The dislodging force is not ordinarily exerted labially, but on the incisal edge, where a

piece of candy may cause chipping by exerting a pressure of from thirty to forty pounds, as demonstrated by Dr. Black. But even accepting the theory that the force is exerted labially, a stone in a raisin-cake, or a terrapin bone, or any other hard substance, may readily exert a pressure of ten to forty pounds on a filling that cannot hope to bear a stress of two pounds and ordinarily breaks at from eight to sixteen ounces pressure. I will illustrate to you, gentlemen, how small a blow it takes to knock out a porcelain filling, and I will guarantee, if Dr. Ottolengui will put in a filling—two, three, or four—I will guarantee to knock them out with a blow of not more than twenty ounces. [Dr. Head here demonstrated the force required to dislodge a porcelain inlay by a machine especially devised by him.]

All of this seems to prove that imperishable porcelain fillings are imperishable only so long as they do not receive a blow of from one to two pounds, and yet they are constantly in the midst of forces that may develop a pressure of from thirty to forty pounds. The ordinary porcelain worker has a certain percentage of failures from fractures or chipping. That Dr. Ottolengui does not, makes me feel that his work is under some special divine care. But as to all younger workers, I beseech them not to use his method of cavity preparation.

Tooth-enamel is stronger than porcelain. It will stand the strain labially far better than porcelain. To cut a tooth away at the back as he does, destroying the natural supporting enamel columns of the tooth for the purpose of strengthening the tooth with porcelain, is to work on the theory that tooth-structure is as weak as porcelain. If the tooth is decayed extensively upon the lingual surface, cut it away as an unfortunate necessity, but do not construe it as an advantage. The more porcelain exposed to the percussive force of the lower teeth, the greater the edge line to be chipped and the greater will be the surface to receive some of the crushing blows always hovering around. The smallest incisal angle I ever put on was sloped labially so as to present the minimum surface to percussive blows of the lower teeth. In pock-marks in the incisors running down to the cutting edge, I have cut out the labial wall of the enamel only and inserted a thin piece of porcelain with excellent results. It was only yesterday that such a case returned to my office. The present inlay has been in position about two years. The first one, put in about four years ago, had been broken out by biting incisally on a hard piece of taffy. But when I removed that filling it took me half an hour to do it. The tooth is just as good as before and the filling being entirely protected from blows from behind is doing good service and will continue to do it until she bites on another stick of candy with it. In plain words, porcelain corners stand in the same relation to their surroundings as the modern soldier in battle. Porcelain corners cannot be made strong enough to withstand the blows they may receive. Their only hope lies in avoiding these crushing blows. And Dr. Ottolengui has well spoken when he said the filling should be made to be absolutely clear of the edges of the lower teeth. But he fails to mention that a chance stone in a cherry-pie or a bit of gravel in raisin-cake may exert a force as great as though the tooth itself were left in hard occlusion. In fact, the edge of any porcelain filling, if brought in sharp contact with a hard body during mastication, is likely to chip. This chipping exposes the cement, which by its dissolving makes further chipping likely. The chipped occlusal surfaces of molars and bicuspids can readily be mended by cutting out the line with a fine bur, putting in creamy cement, squeezing this cement out with sponge gold, which is afterward condensed, ground smooth, and polished. These fine gold lines are usually in inconspicuous places and have in my patients almost universally preserved the fillings for years. In looking over my patients during the last week it appeared that five per cent. of my approximo-occlusal fillings in bicuspids and molars have been so mended. The others did not happen to get the full force of mastication on

the porcelain margins. But with these crowns as described by Dr. Ottolengui, the labial enamel wall coming as it does frequently to a knife edge, in my experience makes the porcelain at this point so thin that a certain percentage chip, requiring either to be mended as previously described, or replaced entirely.

It is not my experience that incisal corners come out for lack of retention. They come out from fracture or chipping, which when it starts is apt to increase in geometrical ratio until failure is complete. And this is especially the case where the back teeth are missing and the lower teeth come with direct occlusion on the incisal edge of the fillings. Fifty per cent. of these fillings do not last five years. It was of these fillings that I spoke when Dr. Ottolengui presented his method of putting in corners as a panacea against failure. In not speaking of them he has avoided the most difficult part of the question. Of course he might argue that the missing posterior teeth should be substituted by artificial ones, but if the patients refuse, and wish porcelain in front, the only thing to do is to put in the porcelain fillings, protect them with a gold edge as much as feasible, and when a twenty or thirty pound blow comes on a filling that at best can withstand only three or four pounds, take out the pieces and put in another filling. In this instance a man must not be condemned by the failure of his filling. Cosmetic effect takes precedence over strength. He does the best the materials will allow.

Dr. W. B. Dills, Brooklyn. I do not think I can vary a great deal from the cavity preparation which the essayist has described, except that I think he has sacrificed a little more tooth-structure than I would.

I do not think I can do other than commend the paper. The essayist has covered the ground very thoroughly, and I certainly admire his ingenuity, and I shall be more than glad to apply the principle whenever the opportunity should offer itself. There are, however, possibilities with some of the other methods of cavity preparation which I deem worthy of consideration, as in the preparation of cavities in a large variety of fractures and badly broken-down incisors and canines—and my position is based upon a clinical experience of many years. There is no question as to the correctness of Dr. Ottolengui's deductions regarding the direction of stress upon porcelain fillings of this class. I have in mind several cases at the present time in which the cavity preparation externally is almost identical with that in vogue for gold fillings, but the interior of the cavity is formed to give as much strength as possible at the point of union with the enamel and porcelain.

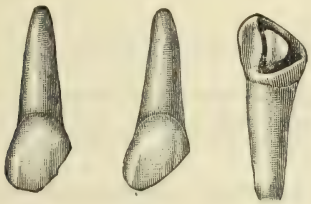
One of the most important features in the introduction of any porcelain filling is to secure space between the base of the porcelain anchorage for sufficient cement to prevent cleavage, which is almost sure to take place when the filling fits the floor of the cavity so close that it permits of but a thin film of cement between the filling and the tooth. I think this is a well-recognized fact with those who have had a considerable experience in this comparatively new art. Another important feature, to my mind, is the grooving or undercutting of that portion of the porcelain which is embedded in the cement.

In the beginning of my experience with porcelain I was in the habit of cutting a continuous groove, sometimes two of them, around the entire filling. Experience, however, taught me that this was a great mistake, as it proved the weakest point of the inlay and it was only a question of a little time when a contour would break off at the line of the groove. I found in making irregular impressions, without running them into each other, I could secure just as good retention without weakening the porcelain, which, together with the aforesaid provisions in the depth of the cavity, will go a great way toward making permanent those fillings which it may seem ill-advised to prepare after the method so beautifully described by the essayist. This is in view of the fact that some teeth are so very thin, and are of such a pecu-

liar formation, that it would seem impossible to apply the principle of cavity formation which the essayist has advocated.

Dr. G. B. Parker, Watertown. I would like to ask Dr. Head a question. You said in your discussion that porcelain fillings inserted in cavities prepared like Fig. 4, *c*, would not last exceeding five

[Fig. 4.]



a *b* *c*

years; would it not then be inadvisable to replace that with porcelain?

Dr. Head. I have never said that my porcelain fillings are going to last a lifetime. I put in porcelain filling with the feeling that when that forty pounds of pressure comes, it is going to be knocked out. When it comes out I put in another, and my patients are glad to have me reinsert it.

Dr. Rose. You mentioned the fact in your discussion that the Jenkins low-fusing porcelain was fractured with small blows from seven to fourteen ounces. I would like to know the comparative strength of the high-fusing bodies.

Dr. Head. I knew I would be asked that question, and so I worked late every night this week in order to be able to answer it. I prepared specimens of a number of the high-fusing bodies, the S. S. White, the Whiteley, and others, and tested them in the same way; and, gentlemen, while the Jenkins body would break with blows exerting from six, seven, and eight ounces, the others would break with blows at from seven, eight, and nine ounces. And so I really think that so far as the real protection goes one is as good as another.

Dr. Ottolengui. I would like to ask Dr. Head whether he has ever made and inserted and received a fee for an inlay made with the Jenkins body?

Dr. Head. Yes, I have.

Dr. Ottolengui. Was it satisfactory?

Dr. Head. It seemed to be, although it was not as satisfactory as the high-fusing body.

Dr. Ottolengui (closing the discussion). I feel, I may say, very much flattered by the discussion that has been accorded this paper by Dr. Head, because he has not answered anything in it. The subject of my paper was the retention of porcelain corners, and those who have heard it know that it relates entirely to the mechanical aspect of the question; while Dr. Head's remarks were altogether about the lasting qualities of porcelain.

This beautiful little board which Dr. Head has brought here absolutely prooves nothing. I wonder that Dr. Head has wasted so much time getting it up. He has fractured a piece of porcelain in a way and with a blow such as is never received in the mouth except in the possible case of the raisin-cake or cherry-stone. In cases where we are restoring a part of the incisal edge of a tooth, I have pointed out in all teeth here that they are not in contact with the lower teeth. There is not any danger to the incisal area, and force naturally will not transmit any impact to the inlay, but will be received by the incisal edge of the natural tooth. My inlay is protected in such a way that the impact does not reach the incisal edge of the porcelain except in the possible case of the raisin-cake or cherry-stone. Now, that is why I said that my fillings did not chip, and thus far they have not. Dr. Head in his discussion has spoken of fractures, but nowhere has he said that the whole corner of the porcelain was broken off, or that it was the failure of the porcelain and not the retention.

On motion, the subject of Dr. Ottolengui's paper was passed.

(To be continued.)

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EDITORIAL DEPARTMENT.

TO THE DENTAL RECRUITS, GREETING!

AN army of novitiates will have taken the first steps toward a dental professional career as this issue of the DENTAL COSMOS reaches its readers. What they expect and what they will achieve would furnish an interesting subject for investigation. A small minority undoubtedly are entering upon dental study with correct conceptions of the career ahead of them, and with the advantage of considerable preparatory training especially adapted to fit them for intelligently taking up the work of the professional course. These are the students whose family relations have brought them into contact with practical dental ideals in a more intimate degree than is the lot of the casual observer. They have lived more or less in a dental atmosphere and absorbed something of its influence, so that their mental attitude regarding the work, their expectation and belief as to its possibilities, their grasp of method for the achievement of their purpose—indeed, the purpose itself—are all more justly and clearly defined, so that the difficulties of adjustment to new conditions which beset the careers of novitiates in the dental course are likely to be more easily and quickly overcome by students of this class.

Unfortunately, the men who have had these early advantages are but a minor proportion of the great body who annually matriculate in our dental

colleges. The majority enter almost entirely ignorant of the great and important elements that are vital factors in the professional life of the dental practitioner. The necessity for maintenance, the attractions which a professional career holds out to many, as compared with a commercial life, are often the prime motives, often the only ones, which determine the selection of dentistry by the matriculate. But, beside all that goes to make up the professional course of instruction the new recruit in dentistry has to learn the broader and far-reaching factors that underlie and direct professional activities. His ideals, as a rule, have to be created anew, and he must unlearn much that he has regarded as settled fact. This process of readjustment of the mental attitude of the student toward his work is a time-consuming, and not infrequently a soul-harrowing process. It is more difficult to unlearn and begin over again than it is to learn correctly from the start. It is with a view to helping these prospective additions to the professional ranks to make the right start that we wish to direct their attention here to a few fundamental considerations in connection with their chosen life-work.

In the first place we would have them realize that dentistry is not wholly or even essentially a mechanic art, but it is a department of the great science and art of healing, or of medicine in the broadest application of that term. In a strict sense it is no more a mechanic art than surgery or ophthalmology, and if it were the custom for the surgeon to make his own appliances or the ophthalmologist to grind and mount his lenses the analogy between these specialties and dentistry would be practically complete; the analogy becomes closer just to the extent that the dental surgeon employs his mechanic for the making of his prosthetic restorations. As the dentist, then, is a healer, his practice is essentially that of the therapeutist, and he is successful in proportion as he keeps that ideal in view. If he restores the function of mastication by inserting artificial teeth, he is unquestionably the healer, the therapeutist, for he has done that thing which in its place and degree contributes to the health of his patient, and it is for that service that he is entitled to his fee as a professional man. It is not the means to the end but the end attained for which he charges and for which he may rightfully demand remuneration. If, however, he sells a set of teeth to his patient and demands remuneration therefor only upon the value of the material and skilled labor involved, he is an artisan, a mechanic, and his transaction is purely a commercial one subject to those influences of supply and demand, of competition and trade, which determine the values involved in business. The objective ideals which are involved in the two propositions here outlined should be clearly understood and the attitude of the student's mind adjusted thereto early in his professional course; for the adoption of the one or the other will determine whether his career as a student as well as a practitioner shall be in harmony with the present trend of dental teaching and

practice or not, and as a consequence whether his work shall make for success or end in a hopeless mediocrity.

It is just exactly this difference of ideal with regard to the meaning and place of dentistry that adapts and fits the intellectual attitude of the student to the course of professional instruction or throws him completely out of harmony with it, makes him discontented with his work, and develops in him an attitude of constant protest against the requirements of the curriculum throughout his college career. The man who goes to college today with the idea that the only end as well as the purpose of the course is to develop in him the skill to make dental mechanisms, artificial substitutes, and to fill cavities has failed to grasp the situation in its entirety, nor has he realized the place which manual skill and dental mechanics properly fills in the curriculum and in dental practice. He must learn that these things are not ends in themselves but means to an end—the end of therapeusis, of healing. They are in principle related to dentistry as pharmacology is related to medicine, for both are means employed by the intelligent therapeutist for the restoration of his patient to health. With that object in mind the student quickly comes to understand why the dental curriculum has been made to include those branches of study which deal with the composition, structure, and functions of the human body—so that he may know what normal health means and how to deal with his special problems involving deviations from the normal. In the treatment of the disorders of that portion of the body which constitute his province, the art of his profession, involving as it does the construction of restorative mechanism, then falls into its proper place and sphere in his mind as a means to the end—that of healing.

The student entering upon the dental course today is weighted with a heavier responsibility than those who have preceded him. The extent of knowledge required is greater, the professional responsibilities and activities more varied and exacting. The public and the profession both rightfully expect more of its practitioners than in times past. Dentistry demands a man's best talents, his best endeavors, the best that is in him; and upon those who serve her faithfully and well she bestows her rewards, which are many and generous, but they are to be attained only in the front ranks and not by the camp-followers.

The DENTAL COSMOS salutes the new recruits with a hearty welcome, and wishes them God-speed toward the success in their careers that awaits all who honestly and intelligently work toward the right ideals in professional dental practice.

BIBLIOGRAPHICAL.

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In these days of intense activity along all lines of human interest the tendency to specialization is a necessary result, and as a corollary of this specializing tendency the multiplication of publications for the dissemination of special and technical data progresses *pari passu* with the development made in each department.

So multitudinous have these special organs become that it is not easy to designate a field not well represented today by its particular medium of publication. Indeed the tendency to overdo the "official organ" business is one which may well be considered, at least in some directions where quality has been not a little sacrificed to quantity.

The *State Board Journal of America,* which makes its début with the September issue, is, however, one of the new journals worthy of a hearty welcome as filling a distinct need. The increase in restrictive legislation defining the limits under which the healing art may be legitimately practiced, and the constant modifications through which such legislation in its evolution is passing, involves a mass of matter which cannot be adequately handled by any journal having other and equally extensive interests. A special publication devoted to legislative matters in medicine, dentistry, and pharmacy is therefore a desideratum which must become popularly successful as an enterprise simply from its intrinsic usefulness.

"It is the purpose of the *State Board Journal* to become the organ of the state board, the student, and the college; a forum in which the rights and opinions of all parties concerned shall be impartially presented and freely discussed." This purpose faithfully and intelligently carried out cannot fail to subserve a most laudable and satisfactory purpose, not only in bringing about more harmonious interrelations among the constituent factors to whom the journal appeals, but also by its educative influence in developing clearer ideals as to what can and what cannot be attained by professional legislation.

We bespeak for the *State Board Journal of America* a sympathetic attention from all affected by the interests which it represents, and wish for it the popular success which the intrinsic merit of its cause fully warrants. The initial number is full of interesting matter and is a model of editorial and typographic excellence.

REVIEW OF CURRENT DENTAL LITERATURE.

Conducted by JULIO ENDELMAN, D.D.S.

[*Dental Record*, London, September 1905.]

COUNTER-DIES. By H. J. Morris.

The writer advocates the use of dies and counter-dies of zinc. The use of lead counter-dies he most decidedly objects to for the reason that when employed in connection with a zinc die the softness of lead materially interferes with the carrying of the plate into the depressions in the zinc. Zinc which is just at the melting-point will not liquefy a zinc die immediately after it has solidified. Therefore, as soon as a zinc die has solidified, and while it is still very hot it can be removed from the sand, reversed and the counter-die of the same metal poured on it without the necessity of coating or cooling it provided the zinc is not poured until it has begun to crystallize around the edge of the ladle.

[*La Stomatologia*, Milan, August 1905.]

AN IMPACTED CANINE IN THE FLOOR OF THE LEFT NASAL FOSSA. By Dr. L. Viganó.

The author describes the case of a boy aged ten who complained of a feeling of uneasiness in the left nasal fossa. A muco-purulent discharge through the nostril of the affected side, and a break in the continuity of the palatal tissue on this side, together with a discharge through the disorganized tissue into the mouth, were the most salient objective symptoms. The affected nasal fossa was inflamed and swollen and was the seat of vegetations which bled easily. Further examination showed that the osseous floor on that side of the nose was in a necrotic condition, and this together with the other symptoms present led to a diagnosis of tertiary manifestation of syphilis.

The usual specific treatment was prescribed, but as no improvement could be detected after a reasonable period of time, a closer examination was made of the affected area, removing all the inflammatory tissue which had accumulated there since the beginning of the disturbance. This revealed the presence of a hard body which was diagnosed as an impacted tooth by Dr. Platschick, who was called into consultation by Dr. Viganó. The body was removed, and proved to be a well-developed canine. Shortly after the operation all the inflammatory phenomena subsided.

[*l'Odontologie*, Paris, July 30, 1905.]

RESULTS OF DENTAL IMPLANTATIONS. By Dr. Oscar Amoedo, Paris.

The author has practiced implantations during the past seventeen years with results beyond rational expectations. He mentions the case of a patient in whose mouth he implanted an upper central incisor fifteen years ago, and another case of thirteen years' standing in which he implanted two incisors. In both cases the implanted organs are rendering good service.

The author mentions several other cases which tend to show that the duration of implanted teeth is far longer than generally believed, opinions to the contrary notwithstanding.

[*Revue de Chirurgie Dentaire*, Paris, June 1905.]

ULCERATION OF THE TONGUE OF DENTAL ORIGIN. By M. G. Guérard.

The case described by M. Guérard shows in a most emphatic manner that too much care can never be exercised in the diagnosis of inflammatory disturbances affecting the soft tissues of the mouth. The patient in question was referred to M. Guérard for the treatment of a severe stomatitis of mercurial origin, having been under specific medication during the previous four months. The diagnosis of syphilis was made on account of the appearance upon the border of the tongue, on the right

side, of an ulceration presenting the characteristics of an initial lesion. The lower teeth were loose and the gingival and mucous membranes were covered with a layer of mucopurulent matter.

The mouth and teeth were thoroughly examined, when it was found that the lower right first molar was deeply decayed, and as the result of this carious invasion presented sharp and ragged edges particularly upon the lingual aspect. At the consultation the patient stated that the ulceration upon the tongue, which was then of four months' standing, was of the same character as when it originally appeared or shortly after, showing that the treatment to which he had been subjected was altogether useless. As the soft tissues around the badly decayed tooth were severely affected it was at once extracted. The remaining teeth and mucous membrane were given the necessary attention, and altogether the mouth was placed in as healthy a condition as possible. Soon afterward the ulceration and all other inflammatory conditions entirely disappeared.

From the outset the essayist believed that the patient was free from syphilis, and that the ulcer upon the tongue had been caused by that organ rubbing against the sharp edges of the decayed lower first molar. This was easily proved to be the case, as the diagnosis of syphilis was later on rejected by a capable specialist.

It seems unnecessary to add anything further to the description of this patient's unfortunate experience, unquestionably the result of a hasty medical examination by a practitioner unmindful of the pathological consequences of diseased teeth. The presence of a slight adenitis was in that practitioner's opinion a confirming element of diagnosis, while as a matter of fact and as was ultimately shown by M. Guérard, the adenitis had originated in the infectious condition in and about the structures of the mouth.

Cases of this sort are coming up almost daily, exemplifying the necessity for a closer relationship between the general practitioner and the oral specialist, and the sooner the members of the varied specialties of the art and science of healing come to a full realization of the significance of such an alliance the greater will be the benefits to those intrusted to their care.

[*La Stomatologia*, Milan, August 1905.]

STYPTICIN IN GENERAL AND DENTAL PRACTICE.

Stypticin comes in the form of yellow crystals, perfectly soluble in water and of a decidedly bitter taste. Its physiological action may be said to be both general and local, and apart from its hemostatic action it possesses also sedative and anodyne properties. The general hemostatic action of stypticin is probably the result of its influence upon the blood-controlling centers in the brain. It decreases the velocity of the circulation and modifies respiration, but according to Falk does not alter the caliber of bloodvessels. According to the investigations of J. Lavialle and Ch. Ruyssen, when exhibited in pulmonary hemorrhage, it arrests the flow of blood by dilating the vessels and lowering arterial pressure, thus facilitating the formation of thrombi. Little is known at present concerning its local action beyond the fact that it is an efficacious agent and that it exercises no toxic action whatever. Locally, and in cases of traumatic epistaxis, Munk and Jahl employ it in the form of gauze saturated in thirty per cent. solution. In cases of hemorrhage following the extraction of teeth or compound fractures, stypticin appears to have given very satisfactory results. The treatment consists in tampooning the alveolus with gauze saturated with thirty per cent. solution of stypticin or in introducing into the bleeding alveolus a 0.05 gm. tablet of stypticin and packing it tightly with aseptic cotton.

[*Revue Odontologique*, Paris, August 1905.]

BUCCO-PHARYNGEAL ANTISEPSIS. By Dr. Gillet.

In a recent number of *Medications nouvelles et Gazette des Maladies Infantiles*, Dr. Gillet recommends the following antiseptic preparations:

I.

℞—Phenosalyl,	gr. xv;
Glycerin,	ʒvij;
Spirit of peppermint	gr. lxxv;
Carbolic acid,	gr. jss;
Benzoic acid,	gr. xlv;
Tincture of eucalyptus,	fʒijss;
Water,	Oij. M.

Sig.—Mouth-wash.

P. Le Gendre.

II

℞—Menthol, gr. xv;
Alcohol, f℥iv;
Water, Oij. M.

Sig.—To be used as a mouth-wash in full strength or diluted.

SABATTAIN.

For buccal irrigations either one of the following solutions may be employed:

III.

℞—Boric acid, ℥i;
Naphthol, ℥v;
Water, Oij.

P. LE GENDRE.

IV.

℞—Carbolic acid, gr. xv;
Boric acid, ℥vj;
Thymol, gr. vij;
Oil of peppermint, gtt. xx;
Tincture of anise, ℥iij;
Water, Oij.

DUJARDIN-BEAUMETZ.

For throat irrigations:

V.

℞—Salicylic acid, gr. xv;
Alcohol, ℥v;
Water, Oij.

POINSOT.

VI.

℞—Sodium borate, ℥iij;
Boric acid, gr. xviiij;
Salicylic acid, gr. xviiij;
Aqueous saturated solution of thymol, Oij.

M. L. PORTES.

VII.

℞—Labarraque solution, ℥xiij;
Boiled water, Oij.

ROUX.

LOCAL ANESTHESIA IN DENTISTRY.

By DR. JAIME D. LOSADA, Madrid, Spain.

In this voluminous communication Dr. Losada refers to almost everything bearing on the subject of anesthesia as applied to dental operations. He reviews the literature of both general and local anesthesia and discusses the advantages and disadvantages of the general and local agents respectively. Although he shares the opinion of the more conservative practitioners to the effect that the two kinds of anesthetics may be advantageously employed in dental practice, he is, however, inclined to believe that the cases in which local anesthesia is indicated are certainly more numerous than those in which the general agents should be preferred.

Among the disadvantages of general anesthesia enumerated by the author muscular relaxation is perhaps as important as any other. In the course of operations in the mouth, such as the extraction of teeth, the inability of the patient to properly control the muscles concerned in the act of swallowing has resulted in serious accidents which often have terminated fatally. In one case quoted by the author such an accident resulted in a severe attack of pneumonia from which the patient failed to recover.

Before discussing the action of cocain the author devotes a few paragraphs to the study of local anesthesia by refrigeration, and recommends its employment in children and whenever it becomes necessary to anesthetize inflamed areas. The agent to be used for this purpose is the chemically pure ethyl chlorid, as methyl chlorid, ethyl bromid, or mixtures of these three agents in different proportions possess disadvantages from which plain ethyl chlorid is absolutely free, while on the other hand the properties of the latter are not surpassed by any one of the above-mentioned agents or mixtures.

The history of the introduction of cocain in surgery is thoroughly described and embodies features of considerable interest to the practitioner. The writer mentions the agents which were employed for the purpose of producing local anesthesia before the anesthetic properties of cocain were discovered, and likewise the agents which from time to time are being brought out by investigators as substitutes for cocain. In this connection scopolamin, the alkaloid of *Scopolia japonica*, is worthy of some attention, as it promises to render valuable services in the field of surgery. (See COSMOS for September 1905, page 1136.)

The use of cocain in general and minor surgery has not always produced results even reasonably satisfactory, for as a matter of fact the cases are not few in which accidents of most serious nature have been caused by the injection within the tissues of solutions of cocain of different strengths. The susceptibility of the patient to the action of the drug cannot of course be ascertained without first submitting him to its effects, and consequently some other means must be scrupu-

lously adhered to in order to prevent those disturbances of circulation and respiration which have been recorded against cocain. Two important factors enter into the solution of this problem, first the strength of the solution and second the position of the patient. Regarding the concentration of the solution, the operator should bear in mind that the greater the dilution of the preparation the less is the danger of post-operative accidents. For instance, if it has been decided that a given amount of cocain can be safely injected hypodermically, this amount should be dissolved in a quantity of water necessary to produce solutions not exceeding 1½ per cent. at the maximum. Reclus, who may be safely considered the highest authority upon the subject of cocain in surgery, employs today solutions of one-half of one per cent, with results all that could be desired. He has been gradually decreasing the strength of his solutions from five, the percentage he employed at the beginning of his experience, to the small one he invariably adheres to at present. Owing to the powerful vaso-constrictor action of cocain it should never be administered to patients in the upright or sitting positions. In dental practice this requirement may be at least partially fulfilled by keeping the patient in the dorsal decubitus during the injection and operating in the usual position as soon as the effect of the drug has taken place. Upon the completion of the operation the patient should at once be returned to the horizontal position in order to prevent by gravity that cerebral anemia so often witnessed in persons susceptible to its effects when the injection is given in the upright position.

After describing the technique of administration the author alludes to the properties and applicability of stovain, the local anesthetic agent recently isolated by Mons. Fourneau, the distinguished French chemist. Dr. Losada finds stovain valuable in dental practice, and employs it in solutions of two per cent., injecting of this solution a quantity varying from fifteen to twenty-three drops.

[*British Dental Journal*, London, August 15, 1905.]

A NEW METHOD OF MAKING RETAINING POINTS IN PORCELAIN INLAYS. By Mons. B. Platschick, Paris.

After having cut a piece of platinum foil of a convenient size, it should be lightly pressed into the cavity. A ring is afterward prepared with half-round wire, either of pure gold or platinum-gold alloy. The alloy must be selected according to directions given later, and the thickness of the wire should be, as one will see farther on, proportionate to the depth of the cavity and to the groove we desire to obtain. The shape of this ring will approximate to that of the bottom of the cavity, but it will be a little smaller. It is placed on the platinum foil, the round side touching the platinum, and then a very little piece of pure gold foil for filling (not thicker than say No. 5 or 6) is inserted between the ring and the platinum foil. Place the whole over the Bunsen burner flame, or in an electric furnace, and withdraw it when the gold foil is melted, and consequently the half-round wire soldered to the platinum. The platinum foil provided with the ring is now pressed well into the cavity of the tooth and the inlay finished as usual. After baking, remove the platinum foil as usual, and with a chisel or a wheel expose the ring. Then boil the inlay in a few drops of aqua regia in an evaporating dish. The ebullition should last five or ten minutes, according to the size of the ring and the alloy used, and ought to be done under a well-ventilated chimney. After this boiling the metal will be dissolved, and there will be in the inlay an undercut groove the shape of the wire. The author feels that this method, which of course is unnecessary where it is easy to obtain an excellent anchorage by grinding with a wheel, is of great use in small, thin inlays which have not to support a very great masticating strain. The half-round shape of the wire is not essential, a wire triangular or otherwise will produce depressions of an excellent retaining form.

PERISCOPE.

The "Odontagogon Law."—The skilful operator extracts more teeth with elevators than he does with forceps, for nearly every tooth that may be grasped by forceps may be saved.—*Exchange.*

Burns.—Washing soda is found in every house, and a saturated solution of this substance allays the pain of burns probably better than any other immediate application. —*Carolina Med. Journal.*

To Prevent Warpage of Plates.—When polishing a thin rubber or gutta-percha plate, fill it with plaster before putting it on the polishing lathe, first filling the undercuts with wax.—*Tri-State Dental Quarterly.*

To Protect Inlays from Moisture After Setting.—To prevent moisture reaching the inlay after seating it in place, cover with the surplus cement and firmly press a piece of tin foil over the whole. This will adhere for hours and is of course absolutely impervious to moisture.—C. B. Rohland, *Dental Review.*

Treatment of Gingivitis.—The following combinations are recommended in the treatment of gingivitis:

℞—Salol, gr. xv;
Tinct. catechu, ʒj;
Spts. menth. pep., ʒx. M.

Sig.—One teaspoonful in half a glass of warm water as a mouth-wash.

Or:

℞—Acidi carbol.,
Pot. chloratis, āā gr. xx;
Syrupi simp., ʒj
Aq. camphoræ, ʒiij. M.

Sig.—One dessertspoonful as a mouth-wash, diluted in half a glass of water.—*Journal of the American Medical Association.*

Shading Inlays.—In selecting shades for porcelain inlays, pick a shade darker than seems necessary for labial cavities at the gum margin. The tooth usually deepens in color as it approaches the gum, and unless the inlay is darker than the rest of the tooth, it will be noticeable. For approximal cavities in incisors or canines, select a shade lighter than the case would seem to indicate. There is usually a slight dulling of the color in these inlays when cemented, and if the inlay matches the tooth perfectly before setting it will be a shade too dark after being cemented.—I. W., *Dental Review.*

Truing Lathe Grindstones.—To true lathe grindstones, hold a piece of chalk lightly against the revolving stone, using a hand-rest so that the chalk touches the bulging part. Hold the chalk part of this stone against another revolving stone in the lathe firmly with a hand-rest, thus truing one stone with another.—Will S. Payson, *Dental Review.*

Ptyalism.—For tender, bleeding gums from any cause, associated with fetid breath:

℞—Formaldehyd (40 per cent. sol.), ʒj;
Thymoli, gr. x;
Tincturæ benzoini compositæ, ʒij;
Alcohol, q. s. ad ʒiij.
M.

Sig.—Teaspoonful in wineglass of water as a mouth-wash, every two or three hours.—*Medical News.*

X Ray in the Diagnosis of Neuralgia.—In any case of neuralgia it is our duty to have a radiograph taken. If the skiagraph be negative, you have, at least, done your duty. An inverted third molar is a common cause of facial neuralgia, the crown of the tooth pressing on the nerves passing through the inferior dental canal. I cannot imagine how a tooth could be in that position without producing such results.—T. W. Brophy, *Dental Hints.*

Taking Impressions.—I have one little suggestion to offer in the taking of impressions—particularly in those cases that are extremely sensitive and easily nauseated—that I have found useful and helpful, and that is to sponge the mouth with hydrogen dioxid. After having thus cleaned all the mucous surfaces, apply a 3 : 100 solution of eucain to the whole palate. That will enable one to take an impression in the most exaggerated cases of palatal sensitivity.—T. B. Hartzell, *Texas Dental Journal.*

To Make an Under Plate for Old People when the Ridge is Almost Gone.—Be sure and make the plate where it sets on the gum and tissues as wide as possible, and at the back part scoop out the rubber of the buccal side all you possibly can from the necks of teeth to the rim, so the cheeks will fall into the concavity and help hold the plate down. The plate will look wide, but your patient will be pleased after wearing it.—L. W. JORDAN, *Pacific Dental Gazette.*

Orthodontia.—While there is no one best rule for regulating all cases, there is generally one best way of accomplishing the highest results in a given case. The highest aim should be to accomplish not only the greatest possible degree of beauty in facial form, but also an improvement in mental expression through the form. Movers of teeth there may be many, but of molders of the face, to the highest possible benefit, there are not so many.—JOHN NATTING FARRAR, *Dental Record.*

Treatment of Hemorrhage After Extraction.—I have found the following very practical. For hemorrhage after extracting a tooth where there is an approximal tooth left, ligate a German silver matrix with an extension soldered to it with soft solder, letting this extension pack tightly over the bleeding alveolus. Under this extension pack tightly cotton with a styptic. Leave it on for twenty-four or forty-eight hours. This will not hinder the patient in eating.—WILL S. PAYSON, *Dental Review.*

Reasons for the Insertion of Plastic Filling in Deciduous Teeth or in Those which Decay Rapidly.—The reasons for inserting a plastic filling in young teeth or those decaying rapidly are not because these teeth are soft and may later become hard, or that they are not sufficiently dense to bear metallic fillings. Plastic fillings and inlays, which come into this class, are used in young teeth, because—

(1) They cause the young or debilitated less stress in insertion.

(2) They are relatively non-conductors of thermal changes.

(3) They cause less irritability to the peridental membrane during insertion.

(4) The pulp in young teeth is so large that in many cases its life would be endangered by a metal filling.

(5) Greater portions of enamel may be left for esthetic reasons.—A. E. WEBSTER, *Dominion Dental Journal.*

Thrush.—*Revue Française de Médecine et de Chirurgie* recommends:

℞—Sodium bicarbonate, ʒj;
Sodium borate, gr. xxx;
Syr. of blackberries, ʒj. M.
Sig.—For a mouth-wash.

In rebellious cases, the affected mucous membrane may be rubbed with a piece of rough linen, and the following applied:

℞—Glycerin, ʒj;
Starch,
Sodium borate, āā ʒj. M.
Sig.—Apply with a camel's-hair brush.—*Monthly Cyclopedia of Practical Medicine.*

A Hint on Gold Inlay Making.—Burnish a platinum matrix as for a porcelain inlay, paying no heed to small openings in the platinum. Paint the surface of the matrix that comes in contact with the tooth to be restored, and all parts not intended to be covered with gold and where the matrix extends beyond the margins, with a thin mixture of prepared chalk and water. The matrix is now filled with the required karat of gold and the gold fused, using no flux. The gold will not flow beyond the margins. Set small inlays before removing the surplus matrix and allow the cement to set before finishing.—F. D. STEPHAN, *Dental Review.*

The Selective Action of Cocain on Nerve-Fibers.—Two hypotheses may be advanced to explain the action of cocain, according to N. E. Dixon (*Journ. of Physiol.*, December 30, 1904). He first considers cocain a general protoplasmic poison; the sensory nerves are affected because they are more exposed, the motor ends are not affected because cocain does not reach them. The second hypothesis holds that cocain specifically affects the sensory nerve endings, just as curare affects only the motor end-plates. The experiments of the author show that cocain applied distally to nerve-fibers picks out and paralyzes some fibers before others, the sensory before the motor, the vagus fibers conducting upward before those conducting downward, the vaso-constrictors before the vaso-dilators, the broncho-constrictors before the broncho-dilators. It is suggested that the local application of cocain to the vagus may be the means of combating death during early chloroform narcosis. Drugs which affect the central nervous system almost invariably attack the sensory cells and fibers before the motor. There is no reason to suppose that cocain has a specific action in the sensory nerve endings.—*Medical News.*

A Nasal Tooth.—An example of this curious anomaly is reported by Hecht, of Munich (*Archiv für Laryngologie*, xvii, 1; *Berliner klin. Wochenschrift*, March 6, 1905), in the case of a man who consulted him for a furuncle of the nostril. The tooth was distant rather more than an inch from the anterior extremity of the inferior nasal passage, and it was firmly implanted. On the opposite side there was a corresponding supernumerary tooth set obliquely in the jaw.—*New York Med. Journal.*

Silver Chlorid for the Sterilization of Drinking Water.—An extremely small quantity of this compound will thoroughly sterilize impure water, even that which contains pathogenic bacteria; 3/100 of a grain to the quart of water is the proportion used. This will absolutely purify the water and eliminate every danger of infection. The process is very simple and can be employed by anyone anywhere. It requires only ten minutes to produce its effect, and no apparatus is necessary beyond the small vial containing a solution of the chlorid. Water thus treated keeps its flavor and all of its properties without modification, only undergoing a slight whitening, which disappears after a few hours of repose. This method of sterilization was discovered by Professor Paterno, an Italian educator.—M. O. Huff, *Dental Hints.*

Obtunding Sensitive Dentin.—In the literature on the subject of sodium dioxid, I have never heard any reference to the obtunding effect of the drug on sensitive dentin. Possibly this is an oversight on my part; but in case no report of such use has been made I feel it a duty to mention the matter to the profession. I have found it to work in a very satisfactory manner in all cavities of extreme and abnormal sensitiveness. I have also found it useful in removing remnants of pulps still sensitive after the use of arsenic.

The application is made by moistening the cavity freely and placing a bit of solid Na_2O_2 therein, or the sodium may be placed in the cavity and a drop of water allowed to fall upon it. A brief period of pain follows, after which the cavity may be dried if convenient and the excavation proceeded with almost painlessly. For deeper work a second application may be necessary. The second application is not followed by as much pain as the first: generally by none at all. The work should be done whenever possible under the protection of the rubber dam and the cavity well washed before inserting the filling.—E. M. Soule, *Items of Interest.*

Shading Facings for Gold Bridges.—In selecting facings for gold crowns or bridges, much care must be exercised to obtain the correct shade. This may be accomplished by the use of a piece of gold or platinum held at the back of the facing. If the crowns are all on one side of the mouth, each crown should harmonize with the corresponding tooth on the opposite side, providing that the natural teeth have not been discolored. Teeth in one mouth are not all the same color. A good effect is usually produced by backing the lateral with platinum, the canine with pure gold and the bicuspid facings with platinum. The central may be backed with the metal which seems best suited for the case, and after a little experience the operator can usually determine at a glance which metal to employ.—*Dental Review.*

Method for Using Platinum Matrix Without Investing.—Secure a piece of platinum plate ½ x ¾ inch and slightly bend up one corner, so that it may readily be grasped by the pliers.

A small camel's-hair brush dipped into powdered borax, then held an inch above the platinum plate and gently tapped, will deposit a thin coating of borax upon the plate. Heat gently and gradually fuse the borax.

When the matrix has been secured, place it upon the platinum plate and put into furnace. The borax will nicely tack the matrix on the plate, and by grasping the upturned corner of the plate with pliers, inserting and removing it from furnace thus, all handling of the matrix itself is avoided and no investment necessary. A redusting of plate with borax will be necessary every third or fourth inlay that is baked.—Crittenden Van Wyck.

Antisepsis in Oral Surgery.—In operations within the oral cavity, asepsis is an impossibility, but antiseptic methods should be used in the highest degree. First, the patient should be placed in the hands of some thorough dentist and the deposits of tartar not alone removed but the entire surfaces of the teeth scaled and polished. In operations of staphylorraphy and uranoplasty the cleft should be freed of all mucous deposits, the walls washed with tepid dioxogen, and some mild wash (such as glyco-thymolin or boracic acid, 4 per cent. solution) on gauze packed within the cavity of the cleft and allowed to remain there until just before making the incisions. Gauze dressing can be placed over the palatal arch and held by tape until the patient fully recovers consciousness and is able to lavage the parts with antiseptic solutions.—William A. Bryant, *Pacific Medical Journal.*

Where Porcelain is Again Useful.—I had presented for repair a perfectly constructed continuous-gum denture, the only fracture being the broken cutting edges of two anterior teeth diagonally. As it appeared too trivial a defect to sanction the removal of the fractured teeth, and yet was an annoyance to the patient on account of roughness and irregularity, I decided upon the following method: I selected the colors of The S. S. White Co.'s inlay powders that, when mixed, matched the remaining portion, and after thoroughly cleansing the denture as in repair work, built up the fractured teeth, and baked in the Hammond furnace until they compared to the original contour. It has proved a gratifying success in appearance and durability, and saved me from much work and risk which would have been encountered in the old method of removal and replacement of teeth. —Stephen Palmer, *Texas Dental Journal.*

Sterilization of Cutting Instruments.—Of fifty-one prominent surgeons who were asked their practice in the sterilization of knives and scissors by H. A. Royster (*Annals of Gynecology and Pediatrics*, February 1905), twenty boil them, two use dry heat, and twenty-one use chemical agents, chiefly carbolic acid or alcohol, or both. Many complaints are made of the ruining of cutting instruments by the process of sterilization. The author has made experiments to determine the effects of the various methods, and arrives at the following conclusions:

1. Knives can be safely sterilized by chemical and mechanical means without the use of heat in any form.

2. The majority of American surgeons are using carbolic acid or alcohol, or both.

3. Immersion in ninety-five per cent. alcohol has the least, and boiling the most, effect in dulling the edge of a knife.—*Western Dental Journal.*

A New Method of Formaldehyd Disinfection.—The Maine State Board of Health has recently brought forward a method for obtaining gas from formaldehyd that is the most simple and inexpensive yet devised. No apparatus is required, and the usefulness of the process has been demonstrated by a long series of experiments. Briefly the procedure is as follows: Potassium permanganate 200 gm. (6½ oz.) to each 500 cc. (pint) of formaldehyd is placed in a vessel of considerable size—a 10-quart pail suffices—in the room to be disinfected, which is preferably quite warm. The formaldehyd, 1000 cc. (2 pints) to each 1000 cubic feet of space, is then poured over the permanganate, and the operator makes a hasty retreat. The room is kept closed for four hours, when disinfection is said to be complete. The simplicity of the above will commend it to anyone desirous of fumigating a room after its use by a patient suffering from a contagious disease.—*Medical Age.*

Tests for the Purity of the Essential Oils.—The volatile oils are often found adulterated in commerce. When adulterated with fixed oils, the fraud can be detected by pouring a little of the oil in alcohol. The volatile part of it dissolves readily, while the other floats on the alcohol. Another simple test is made by putting a drop of the specimen on a piece of paper and exposing that paper to a gentle heat. The essential oil evaporates, while the fixed oil remains in the form of a greasy spot on the paper. If adulterated with alcohol it can be detected by dropping a few drops of the specimen in water. If any alcohol is present the water becomes milky. Another adulteration is often made by mixing expensive oils with cheap ones, but I cannot give any sure test for this case. The druggist finds it out with the help of experience, and the dental practitioner, employing only the cheap oils, does not need to be on the lookout for this kind of adulteration.—A. Augusto, *Pennsylvania Dental Times.*

Porcelain Inlays.—I have reluctantly arrived at the conclusion that it is not advisable to use porcelain inlays for that class of cases where the margins of cavity and inlay are to be subjected to stress, unless the finished gold filling or inlay would be unsightly; as, for example, a large cavity in the mesial surface of an upper first bicuspid, in which case margins of cavity should be extended to the descending slope of the cusps; or, better still, if the tooth be pulpless, to resort to extensive preparation by removing cusps, cutting, occlusally and distally, below the contact point of the second bicuspid. By such procedure margins may be removed from all danger of occlusal stress, with sufficient bulk to obviate danger of subsequent fracture of porcelain. I would therefore limit their use to such cavities as those in which the margins will be in no danger from occlusal stress, with the exception of incisal restorations, where of course they are clearly indicated on account of the esthetic requirements.—Frank E. Cheeseman, *Dental Era.*

The Limitations of Local Anesthesia.—Miles thinks there is danger that local anesthesia may be pushed beyond its natural and legitimate bounds, operations being frequently performed which would be carried out with greater efficiency and equal safety under the influence of a general anesthetic. Operations which were recently reported are cited by him in which the shortest time was five and a quarter and the longest six hours and ten minutes. Although the time consumed in these operations was considerable, it is stated that aside from the fatigue the general condition of the patient was the same as before the operation. The experience was not painless in any of these cases and the author believes that the unconscious condition, and the complete muscular relaxation under general anesthesia, would have enabled the surgeon to do better work than is possible under so-called local anesthesia. There is danger that in local anesthesia discredit may arise by asking more from it than it can reasonably be expected to give.—*Edinburgh Medical Journal.*

Sulfuric Acid in the Removal of Pulps with Calcific Formations.—In about ten per cent. of all the cases where I attempted to remove the pulp by pressure anesthesia, I was unable to get the pulp anesthetized with cocain. In a few instances I have observed that this was due to a calcific formation in the pulp. I have obtained good results in these cases by the application of sulfuric acid. It is not painful, as one might think. Make an application, and wait for a few minutes; then wipe the cavity out with sodium carbonate, and many times you will be able to get the pulp anesthetized. I should say that in about sixty per cent. of the cases in which we have a good pulp there is a calcific formation there of some character. It may be possible to expose a portion of the pulp, and to get a hemorrhage, but at the same time the conditions have produced an irritation sufficiently long to cause a calcific formation, and in that way a diseased pulp, and in many of these cases one cannot get anesthesia sufficient to remove the pulp painlessly.—George W. Cook, *Dental Review.*

Practical Hints.—An excellent tool for trimming around plain teeth in vulcanite work may be made from a broken Gates-Glidden drill by sharpening it to a long, thin point. With it the gums may be festooned and all particles of vulcanite be removed from between the teeth.

A small brush-wheel with a single row of moderately stiff bristles is excellent for polishing around plain teeth in vulcanite work. If wet soap is applied to the bristles they will retain the wet pumice and cut like a knife. Soap rubbed on a felt buff-wheel will retain the wet pumice, causing it to cut much faster and considerably lessening the time and labor of polishing an artificial denture.

An investment compound that is second to none for crown and bridge work and all soldering purposes is composed of plaster and ashes. The ashes may be prepared for use by sifting common coal ashes until all grit is removed and a soft, flaky powder left; the powdered ashes are added to the plaster at the time of mixing, the proportions being about two of plaster to one of ashes. This compound sets very hard and apparently does not contract or expand, nor does it burn out, warp or crack under the heat of the blowpipe. This compound has proved to be far superior to all mixtures containing marble dust, asbestos, sand, etc., and to many of the especially prepared ones that are on the market.—Frederick C. Brush, *Dental Review.*

General Rules in Poisoning.—There are two or three general rules that can be well remembered and that always apply in the first treatment of cases of poisoning if the poison was taken by the mouth.

1. A glance at the patient's mouth will at once determine whether a corrosive or non-corrosive poison was used (in case positive information on this point is not afforded otherwise). And this will at once indicate whether or not an emetic should be resorted to. If a corrosive poison has been swallowed it is better to at once administer warm oil. If a non-corrosive substance has been used, emetics (hot mustard-water) are called for, or the stomach tube.

2. After this first general action it may be wise, and even necessary, to inquire more thoroughly into the question of the kind of poison that is producing the effect under observation, with the view of at once employing specific antidotes.

3. The next requirement is to sustain the natural processes of life by all reasonable and quickly responsive means at hand.

These three general principles will apply to quite every case of the kind, and may be briefly recapitulated thus:

First. Emetics or oil, according to whether or not the mouth is burnt.

Second. Special antidotes, if possible and needful.

Third. Support the patient.—*Monthly Cyclopedia of Practical Medicine.*

HINTS, QUERIES, AND COMMENTS.

PUNCHING HOLES IN BACKINGS.

To punch holes in backings with accuracy I have found nothing more convenient than a small pair of compasses with screw adjustment. Set the points by the pins in the facing and try by punching holes in a piece of copper plate the same gage as the backing; adjust if necessary, then punch the backing and place the side with the bur made by the points away from the facing.

S. PRESTON.

Bramwell, W. Va.

PORCELAIN-FACED SEAMLESS GOLD CROWN—NEW METHOD.

IN those cases where a shell crown is indicated, whether as single crown or as an abutment for bridge work, the all-gold crown is sadly lacking in esthetic requirements.

As ordinarily constructed the porcelain-faced, or veneered shell crown, calls for rather extensive grinding on the buccal side of the tooth to be crowned, in order to make allowance for the extra thickness of facing and gold. In sensitive teeth it is out of the question to obtain this extra space. In the crown under consideration very little more grinding is called for than in the construction of the ordinary shell crown, while the technique is extremely simple, the results artistic and gratifying alike to patient and operator.

To illustrate the method we will take an upper bicuspid. The root preparation is the same as ordinarily practiced, excepting that the buccal side of the tooth should be flattened, instead of rounded. A brass band is now made to fit the neck of the tooth neatly and of length equal to the finished crown. After fitting this band to the tooth, obtaining the cervical contour desired in the finished crown, we then flatten the buccal side of the band so that it lies closely against that surface of the tooth we are crowning. The occlusal margin of the band is trimmed to roughly indicate the cusps of the crown as shown in Fig. 1.

The band is now replaced upon the tooth and a thin coat of vaselin is applied to the occlusal surface and also to occluding teeth, to prevent the adhesion of the cement which is used in obtaining the bite. Any quick-setting cement mixed to the consistence of soft putty and placed in the band will serve this purpose nicely and permit of the imme-

FIG. 1.



diate making of the fusible metal mold, in which the band with contoured cement cusps is reproduced in gold. Omitting the details of swaging a seamless gold crown, we now have a seamless crown with buccal surface flattened and ready for the attachment of the veneer.

To obtain this veneer it is my practice to select from among my stock of old vulcanite teeth one of proper size and shade, and with a thin carborundum wheel outline the surface desired and then remove with excising forceps. By mounting with sealing wax upon cork or soft wood the veneer may be reduced to proper thickness.

The veneer is now mounted upon the crown and its margin waxed flush with the gold.

FIG. 2.



From this we now obtain a fusible metal cast, upon which 24-k. gold plate, gage No. 32, is swaged. After cutting out the center (to represent in outline and almost the size of the veneer) it is re-swaged upon the cast, and ready for final adjustment to the crown.

To prevent a change of color in veneer due

to its extreme thinness the under surface should be painted with prepared chalk before assembling for soldering.

With crown, facing, and rim wired together in the order given, the facing is covered with a thin coating of investing material, and 20-k. solder used to unite rim with crown. To reinforce this crown 18-k. solder is used after attaching veneer.

The use of this crown need not be confined to bicuspids and molars, for in those cases where the canine with vital pulp is to be used as an abutment for a bridge, or where for any reason a shell crown is to be used upon the incisors, the porcelain-faced seamless crown will, if properly constructed, prove substantial and comply with the esthetic requirements of a high-class practice.

J. Allen Johnson.

Middletown, Del.

OBITUARY.

DR. JOHN LITTLEFIELD.

Died, at the residence of his son, No. 1490 North Fifty-fifth st., Philadelphia, July 13, 1905, in the eighty-second year of his age, Dr. John Littlefield.

John Littlefield, son of Samuel and Sarah (Pierce) Littlefield, was born April 24, 1824, at Milton, Mass. His earlier youth was passed upon his father's farm. At an early age he was entered as a student at Chauncey Hall, Boston, a famous school at the time, where his education was obtained. School days over, he took up the study of dentistry with a preceptor at Keene, N. H. His first practice was in his native town of Milton, beginning about 1845. From Milton he removed to Ellsworth, Me., then again in 1852 to Foxboro, Mass. On the breaking out of the war between the North and the South, in 1861, he entered the army as first lieutenant of Company K, Twenty-third Massachusetts Volunteers. He accompanied the expedition of General Burnside to Roanoke Island, and commanded a gunboat at the battle of Newbern. Disability for active service, caused by typhoid malaria, led to his resignation from the army in 1862. On returning to civil life he bought out the practice of Dr. John A. Cummings of Boston, whose patent on a process for making vulcanite was to be the cause, some years later, of so much trouble to dental practitioners of the United States.

Dr. Littlefield continued in the practice of his profession in Boston until 1868, when he became the manager of the department of dentists' supplies in the house of Codman & Shurtleff of that city, in which relation he remained for nineteen years, during which time by energy and fidelity he very largely increased the business. At the close of his service with Codman & Shurtleff he accepted a responsible position with H. D. Justi & Son of Philadelphia, and at the end of a year entered the employ of The S. S. White Dental Mfg. Co., where he remained until his death. In 1890 he went to Australia as the representative of the house, remaining several months, during which time he created a better sentiment toward American-made supplies for dentists, and established better relations with business men than had before been known. Two years later he sailed from Vancouver for Japan, where he did a work similar to that performed in Australia. Passing from Japan, he visited the principal cities of China and India in the same interest, returning home by way of the Suez Canal, Paris, and London, completing the circuit of the globe. From that time on, his duties were mainly connected with the internal administration of the affairs of the company.

Death came suddenly and unexpectedly. Some ten years ago he had a severe illness which left him with a weakened heart and subject to occasional attacks of more or less severe character. The week before his death he spent at the seashore in Maryland, returning to his duties apparently refreshed and invigorated. The heated term, then at its height, prostrated him, but he rallied, and seemed to be on the road to recovery as usual under similar attacks, when almost without warning the final summons came. Services were conducted at the residence on Sunday,

July 16, by Rev. Joseph Hunter of Newark, N. J., after which the remains were taken to Milton, Mass., for interment.

Dr. Littlefield was married in 1849 to Louisa J. Gannett, who died in 1885. He is survived by one son, Mr. John G. Littlefield of Philadelphia, and two daughters, one of whom is the wife of Mr. J. O. Osgood, chief engineer of the Central Railroad of New Jersey; the other, the wife of Mr. E. A. Handy, assistant general manager of the Lake Shore and Michigan Southern Railroad.

He was a Mason of high degree, being a charter member of St. Albans Lodge of Foxboro, of which he was Master at the time his military service began. He was also a member of the Military Order of the Loyal Legion and of the Grand Army of the Republic. Although never specially active in political matters, he served three terms as a member of the legislature of Massachusetts, from 1855 to 1857.

In the death of Dr. Littlefield there passed from the scenes of his labors a strong figure of a man. Of commanding personal presence, with a massive head firmly set on broad shoulders, his very appearance inspired respect and confidence, which only increased as acquaintance grew. Descended on both sides from the earlier settlers of Massachusetts, his life was a reflection of his heritage of sturdy independence, unflinching courage, untiring energy, uncompromising integrity, and a broad discriminating sense of justice. He was a man of wide reading, of extensive information, and liberal views. Whatever question presented, he approached it in the judicial spirit, considered both sides, and reached his conclusions through his reasoning processes. He may truthfully be described as one without prejudices, although his views on any subject which he had considered were pronounced, and maintained when required with vigor and ability. Whoever entered into discussion with him needed to be well posted, for he would be pitted against an antagonist whose knowledge of the subject was likely to be fundamental, whose logic was without flaw, and whose views were presented in a way to carry conviction.

A man of strong feelings, he was without malice. His sense of justice allowed him to respect the opinions of others, no matter how they differed from his own; he recognized the difference in view-point. A kindly man, he was a liberal giver according to his means to worthy objects. Employees felt toward him as a friend who was ever ready to help them.

In the affairs of life he was a man of action guided by a deliberate judgment which rarely went wrong. Whatever course was determined upon found in him no laggard in its execution. Prompt, energetic, resourceful, persistent, he did well and thoroughly whatever he undertook to do.

Forceful, earnest, honest, faithful, Dr. Littlefield measured to the full stature of a man in every relation of life. His friendship was an honor; his memory remains a beneficence.

F. L. H.

DR. GEORGE W. ELLIS.

Died, suddenly, in Paris, June 5, 1905, Dr. George W. Ellis.

The above brief notice, published in the Philadelphia newspapers a few days later, announced the death of one who had long been recognized as a skilful and successful dental practitioner of Philadelphia. He left his home early last May to join his family in Paris, apparently in good health; this announcement of his sudden demise was a sad surprise to his many friends. Without warning, he was stricken by an apoplectic seizure, to which he quickly succumbed.

Dr. George W. Ellis was born in Philadelphia, May 6, 1840. He was educated in the public schools of that city, leaving the high school before graduating to enter a counting-house. Here he remained but a short time, and about 1857-58 he entered the office of Dr. J. F. B. Flagg as a dental student. In 1861 he graduated from the Medical Department of the University of Pennsylvania, and shortly after began practice as a dentist at 113 North Twelfth street, where he remained for several years. In a pleasantly written reminiscence of the late Dr. J. Foster Flagg (*Dental Brief*, vol. ix, January 1904, page 15) we are informed by Dr. Ellis that during his studentship with Dr. Flagg's father he there made the acquaintance of his son. The association was a pleasant one, and later, about 1864, Dr. Ellis and Dr. J. Foster Flagg had offices together, an intimacy that proved mutually helpful. The elder Dr. Flagg was among the first to recognize the mysterious "letheon" of Dr. Morton, the discoverer of

anesthesia, as the well-known drug, ether. This he promptly announced. He was also among the first to appreciate its value, to carefully study its properties, and the best methods for its administration, and soon became known as one skilful in its use, and was frequently called upon to administer it in surgical and other cases. About the time Dr. Ellis and Dr. Flagg were together, the elder Dr. Flagg became almost totally blind, and relinquished his practice to his son. The son being more interested in dental practice, transferred this branch to Dr. Ellis, whose medical education, as well as his inclination, especially fitted him for it. He tells us that he found it both interesting and profitable; bringing him, as it did, into close contact with many medical practitioners, it doubtless proved a stepping-stone to the excellent dental practice he soon acquired.

Early in his career Dr. Ellis was much interested in dental societies, first in the Pennsylvania Association of Dental Surgeons, and later he assisted in organizing the Odontographic Society, May 19, 1863, and for a short time edited its proceedings. He was also associated with the national associations. Of late years his interest in this form of professional activity waned, and he became closely devoted to his large practice.

He contributed to the DENTAL COSMOS an extended article upon "Dentition; its Pathological and Therapeutic Indications," which began in vol viii, May 1867, page 518, and was continued at intervals, the concluding portion appearing in vol. xi, July 1869, page 344. Apart from this, he contributed but little to dental literature.

When the Philadelphia Dental College was organized, he served as demonstrator of Operative Dentistry the first and second sessions, 1863-65; and during the third and fourth sessions took Dr. Kingsbury's place in the Faculty as Professor of Dental Physiology and Operative Dentistry, while Dr. Kingsbury was absent on an extended European tour. The honorary degree of D.D.S. was conferred upon him by this college when he became demonstrator.

Dr. Ellis was recognized by his professional brethren as a skilful, careful, conscientious operator; his work bore the impress of a master's hand. He was fortunate as a business man, retiring from active practice March 15, 1899, and enjoying during the intervening years a well-earned rest. Personally, he was a man it was a pleasure to know. While comparatively unknown to the profession at large, he, nevertheless, did his part well, and will long be remembered as a quiet, unassuming, successful professional gentleman.

He married, about 1864, Miss Meta Ellison, a daughter of the late Mr. J. B. Ellison, who, with a daughter, survives him.

—WM. H. TRUEMAN, in *Dental Brief*.

DR. RASMUS MOLLER NIELSEN STEENSEN.

DIED, at Copenhagen, May 21, 1905, RASMUS MOLLER NIELSEN STEENSEN, D.D.S., in his thirty-sixth year.

Dr. Steensen was born April 23, 1870. He passed his examination in Copenhagen in 1891, and in Philadelphia in 1895.

The dental world about him has lost a chief—a comrade and a leader who by nature was endowed with an abundance of energy and intellect, with all the virtues and faculties which go to make the *homo supersapiens*, one of those rare personalities who once seen is never to be forgotten.

Dr. Steensen had the satisfaction of having worked his way to the foremost rank through his own unaided efforts. His life's progress had been uninterrupted until, last spring, he contracted an attack of influenza, ending in pneumonia.

In his own special art and science he was a proficient, but the great fundamental work in which he was engaged for the benefit of his patients and the instruction of some professional friends did not leave him leisure for the literary work which he had projected on a larger scale; he merely made some demonstrations and gave a few lectures, which were valuable and suggestive, and these will no doubt find their way to the American dental press.

Dr. Steensen was glad, perhaps proud, of his diploma as an American dentist from the Philadelphia Dental College, otherwise he had no official signs of the appreciation in which he was held by clients as well as by colleagues, and he did not live to fill the position of president of the Danish Dental Society, just then offered to him. But in order to give

him the last honors his Danish colleagues wish to raise a monument to him at his grave. His work and life had ennobled him and all who knew him will remember him with admiration and gratitude.

DR. GEORGE E. NETTLETON.

Resolutions of Regret.

At a recent meeting of the New Haven Dental Association the following resolutions were presented, and unanimously adopted, upon the death of Dr. George E. Nettleton of New Haven:

Whereas, By the death of our friend and co-worker, Dr. George E. Nettleton, this association records the loss of one through whose efforts, to a very great degree, we are indebted for our existence as an organized body, and who, while of an extremely retiring disposition, was always on the alert in consideration of the association's welfare; and

Whereas, Our profession loses a representative member, an earnest worker, who for more than thirty years had been honored and trusted by a large *clientèle*, his positive yet affable nature winning for him more than the usual respect and confidence of his patients. He was also a warm friend and helper to many young men entering our profession. During many years' association we never heard him speak a harsh or unkind word. His memory will always be cherished by this association, which will never cease to mourn his loss; therefore be it

Resolved, That we extend to the family of our departed brother our sincere sympathy in this hour of their bereavement; and be it further

Resolved, That these resolutions be spread upon the records of this association, and that a copy be sent to his family.

E. S. Gaylord,
C. W. Strang,
H. A. Spang, *Committee.*

The Hartford Dental Society adopted the following resolutions at its meeting September 11, 1905:

Whereas, We, the members of the Hartford Dental Society, have learned with profound sorrow of the death of Dr. George E. Nettleton of New Haven; therefore be it

Resolved, That we deeply sympathize with his family, and also present our condolence to the New Haven Dental Association in the loss they have sustained. Honored and respected, he was for years regarded as one of the leading practitioners of dentistry in our state. We shall ever revere his memory and deplore his departure. Be it further

Resolved, That a copy of these resolutions be sent to his family, likewise to the New Haven Dental Association, and also that they be entered upon the records of this society.

Albert E. Cary, *Sec'y.*

SOCIETY NOTES AND ANNOUNCEMENTS.

SOUTHWESTERN IOWA DENTAL ASSOCIATION.

The ninth annual meeting of the Southwestern Iowa Dental Association will be held at Creston, Iowa, October 10 and 11, 1905.

Geo. Brooks, *Sec'y*, Greenfield, Iowa.

NORTHEASTERN DENTAL ASSOCIATION.

The eleventh annual meeting of the Northeastern Dental Association will be held at Rutland, Vermont, October 4, 5, and 6, 1905. Every effort is being made to have a successful meeting; and the co-operation of all ethical members of the profession is desired.

Edgar O. Kinsman, *Sec'y*, Cambridge, Mass.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The twenty-second annual meeting of the National Association of Dental Faculties, held at Buffalo, N. Y., July 27 and 28, 1905, resulted in the election of the following officers and committees: J. H. Kennerly, 2645 Locust st., St. Louis, Mo., president; J. I. Hart, New York, vice-president; George Edwin Hunt, 131 E. Ohio st., Indianapolis, secretary; H. R. Jewett, Atlanta, Ga., treasurer. Executive Committee—D. J. McMillen, Kansas City; L. P. Bethel, Columbus, Ohio; J. B. Willmott, Toronto; R. M. Sanger, East Orange, N. J.; H. B. Tileston, Louisville. Ad Interim Committee—S. H. Guilford, Philadelphia; M. C. Marshall, St. Louis; J. P. Gray, Nashville. Foreign Relations Committee—G. V. Black, Chicago; W. F. Litch, Philadelphia; D. R.

Stubblefield, Nashville; William Carr, New York; J. D. Patterson, Kansas City.

Forty-three of the fifty colleges holding membership were represented by delegates and a most harmonious meeting was held. United States Consul J. H. Worman, Munich, Germany, was present at one session and told what was being done to rehabilitate the American degree in that country. Announcement was also made that the United States Government had recognized the National Association of Dental Faculties in its act regulating the practice of dentistry in the Philippine Islands.

GEO. E. HUNT, *Sec'y*,
Indianapolis, Ind.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

AT the annual meeting of the National Association of Dental Examiners, held at Buffalo, N. Y., July 24 and 25, 1905, the following officers were elected: H. W. Campbell, Suffolk, Va., president; F. O. Hetrick, Ottawa, Kans., vice-president from the West; F. A. Shotwell, Rogersville, Tenn., vice-president from the South; George E. Mitchell, Haverhill, Mass., vice-president from the East; Chas. A. Meeker, Newark, N. J., secretary and treasurer. Committee on Colleges—J. G. Reid, Chicago, Ill.; Geo. E. Mitchell, Haverhill, Mass.; J. J. Wright, Milwaukee, Wis. Committee on Conference—J. F. Dowsley, Boston, Mass.; F. O. Hetrick, Ottawa, Kans.; R. H. Walker, Norfolk, Va. Membership Committee—M. F. Finley, Washington, D. C.; Thomas Cole, Newman, Ga.; C. R. Taylor, Streator, Ill. State Advisory Committee—Henry Barnes, Cleveland, Ohio; Geo. E. Mitchell, Haverhill, Mass.; E. P. Dameron, St. Louis, Mo.; C. H. Oakman, Detroit, Mich.; W. G. Mason, Tampa, Fla. Committee for Promoting Relations with Foreign Examiners—T. J. Barrett, Worcester, Mass.; F. A. Shotwell, Rogersville, Tenn.; F. C. James, Winona, Minn.; C. Stanley Smith, Cincinnati, Ohio. Committee on Resolutions—H. C. Brown, Columbus, Ohio; C. S. Stockton, Newark, N. J.; F. F. Drew, Baltimore, Md.; Committee on Contracts—Chas. A. Meeker, Newark, N. J. Committee on Tabulation of Examiners' Reports of Examinations—Alphonso Irwin, Camden, N. J.

CHAS. A. MEEKER, *Sec'y*,
Newark, N. J.

THIRD AND FOURTH DISTRICT (N. Y.) DENTAL SOCIETIES.

A joint meeting of the Third and Fourth District Dental Societies of the State of New York will be held at Schenectady, N. Y., October 17 and 18, 1905. An excellent program of clinics and essays is being prepared by the Executive Committee. All ethical members of the profession are invited to meet with us.

CHAS. E. ALLEN, *Sec'y*, Third District.
F. T. GRENNAN, *Sec'y*, Fourth District.
W. S. ROSE, *Chairman Ex. Com.*

SEVENTH AND EIGHTH DISTRICT (N. Y.) DENTAL SOCIETIES.

A UNION meeting of the Seventh and Eighth District Dental societies of the state of New York will be held at the Osburn House, Rochester, October 31, November 1 and 2, 1905.

Mark these dates off in your appointment book and attend. It will be time well spent. If you have anything of interest communicate with the Business Committee.

C. F. BUNBURY, *Chairman*, Rochester,
J. W. GRAVES, Rochester,
S. ESCHELMAN, Buffalo,
D. H. YOUNG, Attica,
Business Committee.

F. MESSERSCHMITT, Rochester,
G. G. BURNS, Rochester,
Clinic Committee.

JENKINS SOCIETY.

THE Jenkins Society was formed September 1, 1905, with the following charter members: W. I. Brigham, South Framingham, Mass., president; R. S. Miller, Philadelphia, Pa., vice-president; H. H. Gorton, Naugatuck, Conn.; F. E. Cloud, New York, N. Y.; J. Z. Ray, Haverhill, Mass.; J. W. Shaw, Springfield, Mass.; E. P. White, Cambridge, Mass.; G. L. Sturgis, New Haven, Conn.; P. J. Macdonald, Springfield, Mass.; F. S. Baston, Norwood, Mass.; E. H. Goldberg, Bennettsville, S. C.; C. A. Neal, New Bedford, Mass.; T. H. Chivers, Newburyport, Mass.; C. E. Gates, Waterbury, Conn.; J. R. Powell, Jr., Brooklyn, N. Y.; J. H. Tuttle, Brooklyn, N. Y.; W. R.

Wengorovius, Brooklyn, N. Y.; J. B. Brown, Brooklyn, N. Y.; C. S. Hurlbut, Springfield, Mass.; C. F. Gibbs, Bridgeport, Conn.; W. F. Shaw, Westfield, Mass.; D. C. Shaw, Springfield, Mass.; H. J. Pillion, Hartford, Conn.; A. F. Wyman, New Bedford, Mass.

The objects of this society are to disseminate new information in regard to the use of porcelain in dentistry, and to encourage the proper use of porcelain, by clinics and demonstrations. The society is to be international in character, and any dentist in good standing, interested in porcelain work, is eligible to membership.

The annual dues are $1. The dues are to defray the expenses of publication and distribution of new literature on porcelain. All applications for membership should be sent to the undersigned.

B. C. Guile, *Sec'y and Treasurer,*
Penn Yan, N. Y.

NEW JERSEY STATE DENTAL SOCIETY.

At the annual meeting of the New Jersey State Dental Society, held in Asbury Park, N. J., July 19, 20, and 21, 1905, the following officers were elected: J. E. Duffield, Camden, president; M. R. Brinkman, Hackensack, vice-president; Chas. A. Meeker, Newark, secretary; Herbert S. Sutphen, Newark, assistant secretary; Henry A. Hull, New Brunswick, treasurer. Executive Committee — M. R. Brinkman, Hackensack; Walter Woolsey, Elizabeth; W. A. Jacquette, Salem; J. G. Halsey, Swedesboro; Harvey Iredell, New Brunswick.

Chas. A. Meeker, *Sec'y,*
Newark, N. J.

FRATERNAL DENTAL SOCIETY OF ST. LOUIS.

First Annual Clinic.

The first annual clinic of the Fraternal Dental Society of St. Louis will be held November 20 and 21, 1905, at the Barnes Dental College.

Special features of the meetings will be a series of lectures on "Cavity Preparation," "Methods and Principles of Packing Gold," and "Methods and Principles of Finishing Fillings," by Dr. E. K. Wedelstaedt of St. Paul, Minn.; clinics bearing on the Black and Wedelstaedt methods and principles of cavity preparation and filling by Drs. A. C. Searl, Owatonna, Minn.; J. F. Wallace, Canton, Mo.; Wm. Finn, N. C. Booth, J. J. Booth, Ed. S. Brown, W. T. Rutledge, and others; a demonstration of the various phases of porcelain work by Drs. F. E. Roach, G. T. Banzett, W. Leon Ellerbeck, and others. The time proved advantages and disadvantages of high and low-fusing bodies will be shown. Others will operate, showing methods in dental prosthesis and orthodontia. Complete programs will be announced later.

All ethical practitioners are invited to be present and clinic. A full line of exhibits in a beautiful exhibit room. Hotel headquarters at the Jefferson Hotel. Inquiries should be addressed to D. O. M. LeCron, superintendent of clinics, 501 Missouri Trust bldg., or to the secretary.

A cordial invitation is extended to the profession to be present and make this meeting limited in scope but limitless in importance—the best ever held in this section.

Burton Lee Thorpe, *Pres.,*
S. H. Voyles, *Sec'y,*
3201 Washington ave., St. Louis, Mo.

SOUTHERN CALIFORNIA DENTAL ASSOCIATION.

The Southern California Dental Association will hold its eighth annual session in Los Angeles, Cal., November 6, 7, and 8, 1905.

Chas. M. Benbrook, *Sec'y,*
Los Angeles, Cal.

NORTHERN ILLINOIS DENTAL SOCIETY.

The Northern Illinois Dental Society will hold its eighteenth annual convention at Elgin, Ill., October 18 and 19, 1905. All dentists in northern Illinois and adjoining territory are most cordially invited.

A. M. Harrison, *Sec'y,*
Rockford, Ill.

MISSISSIPPI DENTAL ASSOCIATION.

At the twelfth annual meeting of the Mississippi Dental Association, held in Jackson, April 19 to 21, 1905, the following officers were elected: A. B. Kelly, Yazoo City, president; L. B. McLaren, Natchez, first vice-president; J. F. Scott, Summit, second vice-president; E. Douglas Hood, Tupelo, secretary; W. H. Reaben, McComb City, corresponding secretary; C. C. Crowder, Kosciusko, treasurer. Executive Committee—W. O. Talbot, Biloxi; C. F. Boger, Natchez, and E. Douglas Hood, Tupelo.

The thirteenth annual meeting will be held in Gulfport, between June 1 and 15, 1906, the exact date to be fixed by the Executive Committee. It promises to be the best ever held, and preparations are now being made for a good series of papers and some interesting clinics.

E. Douglas Hood, *Sec'y*,
Tupelo, Miss.

MINNESOTA BOARD OF DENTAL EXAMINERS.

The next meeting of the Minnesota State Board of Dental Examiners will be held at Minneapolis, October 3, 4, and 5, 1905, at the Dental Department, State University.

All applications must be in by 12 o'clock noon, October 3d.

Application blanks will be furnished upon request by

F. S. James, *Sec'y*,
Winona, Minn.

MICHIGAN BOARD OF DENTAL EXAMINERS.

The Michigan State Board of Dental Examiners will hold its next meeting for examination of candidates at the Dental Department, University of Michigan, Ann Arbor, Mich., beginning at 9 A.M., October 31, 1905.

Chas. J. Gray, *Pres.*,
Chas. H. Oakman, *Sec'y*,
29 State st., Detroit, Mich.

RHODE ISLAND BOARD OF REGISTRATION.

The Rhode Island Board of Registration in Dentistry will hold its next meeting for the examination of candidates at the State-house, Providence, R. I., Tuesday, Wednesday, and Thursday, October 3, 4, and 5, 1905.

Application blanks may be obtained of the secretary, and must be carefully filled in and returned, together with the fee of twenty dollars, not later than September 25th.

W. S. Kenyon, *Sec'y*,
301 Westminster st., Providence, R. I.

MASSACHUSETTS BOARD OF REGISTRATION.

A meeting of the Massachusetts Board of Registration in Dentistry, for the examination of candidates, will be held in Boston, Mass., October 25, 26, and 27, 1905.

All applications, together with the fee of $20, if first examination, must be filed with the secretary of the board on or before October 18, as no application for this meeting will be received after that date.

Hereafter candidates for second and subsequent examinations will be required to fill out an application blank and forward it to the secretary as above.

Every candidate for examination must be 21 years of age.

Application blanks may be obtained from the secretary.

Temporary licenses are never granted.

The fee for third and subsequent examinations is $5.

G. E. Mitchell, *Sec'y*,
25 Merrimack st., Haverhill, Mass.

MARYLAND BOARD OF DENTAL EXAMINERS.

The Maryland Board of Dental Examiners will meet for examination of candidates for certificates on November 6 and 7, 1905, at the Baltimore College of Dental Surgery, at 9 A.M.

For application blanks and all information apply to

F. F. Drew, *Sec'y*,
701 N. Howard st., Baltimore, Md.

DENTAL COMMISSIONERS OF CONNECTICUT.

The Dental Commissioners of the State of Connecticut hereby give notice that they will meet at Hartford on Wednesday, Thursday, and Friday, November 8, 9, and 10, 1905, to examine applicants for license to practice dentistry, and for the transaction of any other business proper to come before said meeting.

Practical examination in operative and prosthetic dentistry will be held Wednesday, November 8th. The written theoretical examination will be held Thursday and Friday, November 9 and 10.

All applicants should apply to the recorder for proper blanks and rules for conducting the examination. Application blanks must be filled in and sworn to, and with fee, filed with the recorder on or before November 1, 1905.

By direction of the Dental Commissioners,

Gilbert M. Griswold, *Recorder*,
783 Main st., Hartford, Conn.

ILLINOIS BOARD OF DENTAL EXAMINERS.

The regular annual meeting of the Illinois State Board of Dental Examiners, for the examination of applicants for a license to practice dentistry in the state of Illinois, will be held in Chicago, commencing Tuesday, November 14th, and continuing to Saturday, November 18th inclusive.

Persons in possession of the following requirements will be eligible to take the examination: First, Any person who has been engaged in the actual, legal, and lawful practice of dentistry or dental surgery in some other state or country for five consecutive years just prior to application; or (Second) is a graduate of and has a diploma from the faculty of a reputable dental college, school, or dental department of a reputable university; or (Third) is a graduate of and has a diploma from the faculty of a reputable medical college or medical department of a reputable university, and possesses the necessary qualifications prescribed by the board.

Candidates will be furnished with proper blanks and such other information as is necessary, upon application to the secretary. All applications must be filed with the secretary five days prior to the date of examination.

Address all communications to

J. G. Reid, *Sec'y*,
1204 Trude Bldg., Chicago, Ill.

NEW JERSEY BOARD OF REGISTRATION AND EXAMINATION.

The New Jersey State Board of Registration and Examination in Dentistry will hold its semi-annual meeting in the theoretical branches in the assembly chamber of the state house at Trenton, N. J., December 12, 13, and 14, 1905. Sessions begin promptly at 9 A.M. each day.

Practical operative work at the office of the examiner in practical operative work, Dr. C. S. Stockton, 22 Central ave., Newark, N. J. Practical prosthetic work at the office of Dr. A. Irwin, 425 Cooper st., Camden, N. J. All practical work appointments secured from the examiners of those branches.

Application must be in the hands of the secretary two weeks prior to the examination.

Charles A. Meeker, *Sec'y*,
29 Fulton st., Newark, N. J.

OHIO BOARD OF DENTAL EXAMINERS.

The regular semi-annual meeting of the Ohio State Board of Dental Examiners will be held in Columbus, November 28, 29, and 30, 1905, at the Hartman Hotel.

Applications for examination should be filed with the secretary by November 18th. For further information address

H. C. Brown, *Sec'y*,
185 E. State st., Columbus, O.

NEW YORK INSTITUTE OF STOMATOLOGY.

Offer of Prizes.

With the desire of stimulating investigation in any field of activity directly relating to Dental or Oral Science, the New York Institute of Stomatology offers two prizes for the best papers submitted to it embodying the results of such original research.

The first prize, for the best paper, will be a gold medal and $250; the second prize, for the next best paper, a gold medal and $100.

Conditions: (a) The papers offered for competition must be typewritten in English. (b) Must contain not less than 1500 nor more than 3500 words. (c) Must be signed by a motto or *nom de plume.* (d) Must be accompanied by a sealed envelope marked with the same motto or *nom de plume* on the outside, containing the true name as well as the motto of the contestant within. (e) Must be sent to the chairman of the Executive Committee, Dr. F. Milton Smith, 38 West 36th street, New York city, on or before March 1, 1906.

Judges: The following gentlemen have consented to act as judges—Dr. C. N. Johnson of Chicago, editor of *Dental Review;* Dr. Eugene H. Smith of Boston, dean of Harvard University Dental School; Dr. Wilbur F. Litch of Philadelphia, editor of *Dental Brief.*

Rules.

1. The papers will be sent to the judges without the sealed envelopes, containing the names of the contestants, which will be retained by the Executive Committee till the decision of the judges is made.

2. In deciding on the merits of papers offered in competition the judges will be requested to take into consideration the value and character of the research work the results of which are presented, more than the literary character of the essays, but to give the latter due credit.

3. The judges are expressly authorized to decide which if any of the papers submitted to them are of sufficient merit to entitle them to the prizes offered, or to withhold the award from all the papers if none are deemed worthy.

4. Authors of the prize papers will be invited to read their essays before a meeting of the Institute, as will the writers of other papers of especial merit, the Institute reserving the right to the first publication of all papers offered in competition.

Papers not used will be promptly returned to the writers. Those read before the Institute will be as fully discussed as possible and when published will be adequately illustrated.

For further information address

DR. F. MILTON SMITH,
38 West 36th st., New York, N. Y.

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING AUGUST 1905.

August 1.

No. 796,120, to THEODORE GREEN. Dental matrix.

August 15.

No. 796,980, to ROBERT D. ANDREWS. Toothbrush.

No. 797,106, to CHARLES P. GRAY. Hand-operated dental tool.

No. 797,270, to RUDOLF DREHER. Tool for dental operations.

No. 797,312, to HENRY P. OSBORN. Artificial tooth.

No. 797,515, to WILLIAM G. HUGHES. Metallic-backed tooth.

August 22.

No. 797,684, to WILLIAM E. HARPER. Dental instrument.

THE

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ORIGINAL COMMUNICATIONS.

NEW THEORIES CONCERNING DECAY OF TEETH

By W. D. MILLER, D.D.S., M.D., Ph.D., Sc.D., Berlin, Ger.

FOR more than two thousand years the human mind has been occupied uninterruptedly with the study of the cause of decay of the teeth, and many are the views which have prevailed regarding it. Some of these views have represented very creditable attempts to interpret the phenomena of the disease, while others were exceedingly fantastic and to us unaccountable. Naturally the lack of proper methods and instruments for making and studying sections of teeth, as well as the deficient knowledge of general pathology, and in particular of bacteriology, rendered a definite solution of the question impossible to our colleagues of former centuries.

Not until the latter part of the last century, when the science of histology and bacteriology became common property of dental scientists, was it possible to develop a theory which accounted for the phenomena of dental caries sufficiently well to secure its recognition, in a short space of time, by the vast majority of those who had given the subject any attention.

NEW THEORIES ON THE CAUSE OF CARIES.

The desire for new theories seems, however, to be as active as before, and there is a pronounced tendency to make every minor factor which may possibly in some way influence the progress of caries the starting-point for a new theory. Perhaps the most original one of modern times is that of Dr. Eben M. Flagg (*Trans. N. Y. Odontological Society,* 1901, page 108) which interprets caries as an infectious disease working its way from within outward. The bacteria are conveyed to the pulp of the tooth through the blood, and work their way through the dentin and enamel, arriving finally upon the surface of the tooth. It is very doubtful whether Dr. Flagg will be able to convince anyone of the correctness of this view.

Various other theories have recently been brought before the profession, some of which are deserving a more serious consideration.

Some four years ago Karolyi of Vienna made the declaration that decay of teeth is not accompanied by an acid reaction, but that the contents of cavities are often found to be so strongly alkaline as to cause a distinct burning sensation when brought into contact with any abraded surface of the fingers. It has been somewhat of a puzzle to me to understand the position taken by Karolyi, since it is a notorious fact that food-

stuffs found in cavities of decay, as well as carious dentin itself, almost invariably show a decided acid reaction.

Arkövy of Budapest likewise reported that he had observed marked decalcification of a tooth which had lain for some months in a culture medium the reaction of which at the time of examination was alkaline. This observation caused considerable comment at the time, but inasmuch as the reaction of culture media is known to change in the course of time from a decided acid to a decided alkaline the observation of Arkövy loses its significance, and indeed Arkövy very rightly does not draw any conclusions from it.

Preiswerk has likewise furnished a contribution to the subject of caries under alkaline reaction. He argues for the existence of alkaline caries on the ground that acids acting upon the enamel always bring out the striation of the enamel prisms, while this striation is sometimes wanting in caries. He has furthermore been able to produce changes resembling caries through the action of trypsin, a ferment which is produced in cultures of many bacteria. The first point does not appear to me, however, to be sufficiently established. I have in my collection a large number of preparations in which the enamel has been either superficially or totally decalcified by the influence of organic acids, and there is no increase in the striation to be observed; so that we need not by any means always expect an increase in the striation, even though the caries has been brought about by the action of acids. With regard to the action of trypsin on the teeth, my own experiments have had only moderate success. I do not wish, however, to throw any doubt upon the correctness of the conclusions to which Preiswerk has arrived, or to form a definite opinion regarding them until further experiments have been completed. Preiswerk himself emphasizes the fact that his observation is not to lead to the formation of a new theory, but only to call attention to the fact that other possibilities besides acids should be taken into consideration. Goadby ("Mycology of the Mouth") was not able to produce effects such as those described by Preiswerk, by the action of ferments.

At the Fourth International Dental Congress in St. Louis, Hinkins of Chicago presented the idea that the ptyalin of the saliva performs an important rôle in the destruction of cement fillings as well as in the causation of dental caries (see DENTAL COSMOS for March 1905, page 322). According to Hinkins the action of the ptyalin does not stop with having converted starch into sugar; it goes on and forms acid out of the sugar, and this acid may then lead to a destruction of the teeth.* Teleologically considered, the view of Hinkins is open to criticism. We would have here a case in which a physiological secretion attacks and destroys the tissue which it naturally bathes —a process which would be analogous to the gastric juice, or the products of the normal physiological digestion, destroying the walls of the stomach or intestines.

There are other facts, however, which call for a satisfactory explanation before we may express ourselves as convinced of the accuracy of Hinkins' deductions.

Hinkins made use of a solution of triacetyl glucose, to 250 cc. of which he added 50 cc. of a 1 per cent solution of bouillon and 5 gm. ptyalin or pancreatin. This solution was kept in the refrigerator and took on an acid reaction in the course of a few days. A slight increase

* Previously to Hinkins, Michaels of Paris (Proceedings of Third International Dental Congress, Paris, 1900; for English translation, see pamphlet "Sialo-semeiology," DENTAL COSMOS office, 1902) described an experiment intended to prove that glycogen undergoes an acid fermentation under the influence of ptyalin; but as various kinds of micro-organisms, bacteria included, were found in the solution used by Michaels, and as it is known that bacteria may bring about an acid fermentation of glycogen, it is altogether probable that the results observed by Michaels were due to the action of bacteria; and certainly no experiments intended to bring out the action of ptyalin can be considered valid in which the solutions acted upon are not kept sterile.

in the acidity of the original glucose solution was also observed, the quantity of acid produced, however, being generally about one-third of that in the solution to which ptyalin had been added. The experiments of Hinkins cannot be considered conclusive, from the fact that his check experiment was not carried out under the same conditions, no bouillon having been added to the solution. Again, nothing is said as to whether the solutions were kept sterile during the experiments. We must consequently demand a confirmation of Dr. Hinkins' experiments under more precise conditions before accepting their results. But even granting that a production of acid may be brought about in solutions of triacetyl glucose by the action of ptyalin, this fact certainly has but slight bearing upon the changes which take place in the human mouth, since we neither have triacetyl glucose in the mouth nor do we keep the mouth at refrigerator temperature. Accordingly, I have adopted a different method of experimentation in dealing with the question of whether the ptyalin of the saliva has the power of splitting up sugar into acid and actually manifests this power under conditions similar to those present in the mouth.

EXPERIMENTS ON THE ACTION OF PTYALIN ON STARCH.

It is a fact now familiar to all that when a solution of starch or sugar in saliva is allowed to stand for a very few hours in the incubator it takes on a decided acid reaction. I pointed out, however, twenty-five years ago, that when the solution named is agitated beforehand with ether or chloroform, which destroys the bacteria without affecting the ptyalin, no acid is produced, from which we must conclude that ptyalin has not the power to produce acid out of sugar or starch. I also found that when saliva was freed from bacteria by passing it through a Chamberland filter and then a sterilized starch solution was added, no acid was formed. On subsequently infecting the solution with a minute drop of saliva, the acid reaction appeared in a few hours. This experiment was made only once, and must be repeated. Again I found that when ptyalin was added to a 2 per cent. solution of grape sugar in the proportion employed by Hinkins and was kept in the refrigerator at a very low temperature, no acid whatever was formed. Some difficulty was experienced in carrying out these experiments in the incubator, it being next to impossible to keep the solutions sterile. To five tubes each containing 5 cc. of a 2 per cent. solution of grape-sugar bouillon, ptyalin was added, with the greatest precaution to avoid infection, and the tubes were placed in the incubator along with five other tubes infected with saliva. In twenty-four hours four of the ptyalin tubes showed evident fermentation and acid reaction, the degree of acidity compared with that of the tubes infected with saliva being as 4, 6, and 7 to 10. A microscopic examination showed that the tubes all contained large numbers of bacteria. Only one ptyalin tube remained sterile, and in this no fermentation and no acid production took place.

It is my intention to repeat the above experiments before giving a final opinion, but I think that we are already justified in concluding that ptyalin as an acid producer performs a very unimportant rôle, if any at all, as compared with bacteria.

"MUCIN THEORY."

Among the recent theories of caries the so-called "mucin theory" of Lohmann of Kassel has received the most attention. According to Lohmann, caries results solely from the action of mucin upon the teeth. He prefaces his theory with the declaration that acids cannot be formed in the mouth: "On account of the short stay of carbohydrates in the mouth but a very slight transformation of the same can take place, whereby only maltose is formed. The production of lactic acid, however, presupposes the formation of grape sugar, since cane sugar undergoes no changes whatever in the saliva. Consequently lactic acid cannot be formed in the mouth."

In this point we see that Hinkins and

Lohmann come to conclusions which are diametrically opposed. Lohmann's declaration that for such and such reason no acid formation can take place in the human mouth is about as rational as it would be to maintain that no sailing vessel can cross the Atlantic because of the waves. We know that sailing vessels of all classes *do* cross the Atlantic, and thousands of experiments and observations have conclusively shown that acid *is* formed in the human mouth wherever foodstuffs containing carbohydrates remain lodged upon or between the teeth, and all theoretical deductions which lead to a contrary conclusion can only be sadly deficient in one or the other of their premises. The fact that solutions of cane sugar are made use of in the fabrication of lactic acid should alone be sufficient to show the untenableness of Lohmann's position.

It is not my intention, however, to discuss the question whether acids can be formed in the mouth by the fermentation of carbohydrates—that question was settled twenty-five years ago, and it would be a waste of time to take it up again now. I will only emphasize the fact that if there is anyone who still believes that no formation of acid takes place in solutions of cane sugar and saliva, a few experiments will soon convince him of the erroneousness of his belief.

It is quite immaterial whether we make our solutions with cane or grape sugar; the amount of acid formed will be the same in both cases, and what is of still greater importance, if we make a mixture of foodstuffs with saliva we shall obtain still more acid than in either of the sugar solutions. The intensity of the acidity has to me been frequently a matter of surprise. In respect of this, however, I refer to my previous articles. The amount of acid formed in mixtures of foodstuffs with saliva sometimes corresponds in its neutralizing power for alkali to a 2 per cent. solution of lactic acid. This accounts for the intense acid reaction of the contents of concealed cavities of decay.

In view of these facts the theoretical deductions of Lohmann that maltose forms the end-product of the digestion of carbohydrates in the mouth, and that maltose is not fermentable, have no significance in this connection, and need not occupy our time any further.

Lohmann asserts that processes of fermentation in the human mouth play no part in the production of caries and that caries of the teeth is due solely to the action of mucin, which has been set free from its combination with lime by the action of some acid. This assertion likewise deserves only a passing notice. It is made in utter disregard of the facts established by the experiments and observations of the last twenty-five years, by which the destructive influence of processes of fermentation upon the teeth has been irrefutably established.

We may therefore restrict our study to the question whether the destruction of the teeth, which beyond all doubt is brought about by the action of bacteria in the mouth, is *accelerated* by the presence of mucin in the saliva and to what extent.

Lohmann's theory differs in so far from former views as he denies the action of processes of fermentation, attributes an exaggerated importance to the action of mucin, and presupposes the presence of some weak acid which is necessary to liberate the mucin from its combination with soda, lime, etc. It is the last point in Lohmann's theory to which I shall give special attention. Mucin has weak acid properties and exists in the saliva in combination with sodium, potassium, and calcium. In order to liberate it from this combination, some acid such as is taken into the mouth with the food (acetic, citric, tartaric, etc.) is called into requisition by Lohmann.

The idea which is here expressed does not seem to me to be logical or to justify the deductions made from it; for if mucin, which is at most a very weak acid, can be set free only at the expense of some stronger acid such as acetic or lactic acid, the action is about the same as though we were to put a nickel in the slot and get out a cent. We must

not overlook the fact that the acid which frees the mucin must itself unite with the base from which it has liberated the mucin, and thereby it becomes innocuous, so that the process may represent a protection rather than a source of danger to the teeth. For example, supposing the liberating acid to be acetic acid, we would have the formula—Acetic acid + mucin lime = mucin + acetate of lime. The bodies resulting from the reaction are here less harmful to the teeth than before the reaction took place.

In order, however, to test the question experimentally, I prepared solutions of $\frac{1}{8}$, $\frac{1}{4}$, and $\frac{1}{2}$ per cent. lactic acid, acetic acid, acids of various fruits and combinations of these acids, in very viscid saliva, and as checks the same solutions in water. If Lohmann's view were right, then the solutions in saliva would have a much stronger decalcifying action than those in water. Wedge-shaped pieces of dentin were suspended in the solutions, and the degrees of decalcification were determined at varying intervals from a few days to as many weeks. The results were negative throughout. In some cases the decalcifying action was stronger in the watery than in the viscid salivary solutions. In continuation of these experiments, solutions of the various acids which are brought into the mouth with the food or otherwise, as well as fermented solutions of various foodstuffs in saliva, were mixed with mucus, and the action upon dentin compared with the same without mucus. The results were likewise negative. Furthermore, dry mucin prepared from the submaxillary gland of the ox, and for which I am indebted to Professor Tierfelder, was dissolved in a very weak solution of sodium carbonate, and to 4 cc. two drops of the 1 per cent. solution of sodium fluorid were added to prevent decomposition. These solutions did not show the slightest trace of a decalcification upon dentin.

Then 0.058 gm. of dry mucin were dissolved in 3 cc. of very weak alkaline solution, and vinegar was added in small drops until the solution showed a very slight acid reaction. The mucin was thereby reprecipitated, and ought in this fresh condition to be particularly active. Decomposition was prevented by adding 0.6 cc. of a $\frac{1}{10}$ per cent. solution of sodium fluorid. The solution did not show a trace of decalcification upon thin sections after the lapse of six days. The reaction at the close of the experiment was neutral.

All of these and many more similar experiments were carried out with the same results, and lead to the conclusion that the decalcifying action of weak acid solutions is not increased by the addition of mucin.

I now turned my attention to the action of mucin precipitated directly from the saliva. Lohmann recommended precipitating the mucin in the manner first employed by Hammersten. Strong hydrochloric acid (10 to 25 per cent.) is added to the saliva until it contains 1.5 per mille. Mucin which is precipitated becomes redissolved on vigorously stirring the solution, and may then be reprecipitated by adding two to three parts of water. This precipitate is redissolved in hydrochloric acid and precipitated again by the addition of water. The process is somewhat complicated, and at the end but little mucin will be found on the filter. Lohmann writes, it is true, that he sometimes obtained 1 gm. of mucin from 30 cc. of saliva, *i.e.* 3.3 per cent. of mucin. I take this, however, to be a printer's error, inasmuch as this amount is about twenty-five times as large as the total quantity of soluble organic matter in the saliva. It is possible to bring about a slight decalcification of dentin by means of mucin which has been precipitated by hydrochloric acid, for it is extremely difficult to remove the hydrochloric acid from the mucin. We may wash it until the filtrate gives no test for hydrochloric acid and there will still be traces of the acid adhering to it. If, however, the washing be continued sufficiently long or the liquid be repeatedly pressed out between smooth blotting-paper we obtain mucin almost free of acid, which has but a minimal decalcifying action on tooth-substance, and if the mucin be now dissolved in a weak alkali

to form a neutral solution it possesses absolutely no power of action on dentin. Lohmann's experiments could not under any circumstances be conclusive, since we do not have hydrochloric acid in the mouth, nor is our precipitate of mucin repeatedly washed and purified, nor is there any such antiseptic as sodium fluorid in the mouth which prevents the decomposition of the precipitate of mucin.

In my further experiments I adopted a method which admitted of a much nearer approach to conditions existing in the mouth than the artificial process recommended by Lohmann, which is not duplicated in the mouth in any one of its phases. In these experiments the mucin was precipitated either by such acids as we take into the mouth with the food, such as acetic, lactic, tartaric, citric, oxalic, etc., or by acids produced by the fermentation of foodstuffs.

To 33 cc. of very ropy saliva 1.5 cc. of vinegar was added, the flocculent precipitate of mucin thoroughly washed with water, and four drops of a $\frac{1}{10}$ per cent. solution of sodium fluorid added to prevent putrefaction. A wedge-shaped piece of dentin was exposed to the action of this solution for thirty days, during which time the mucin was renewed ten times. At the conclusion of the experiment there was not the slightest decalcification macroscopically to be detected. Again, 4 cc. of an acid liquid obtained from the fermentation of foodstuffs were placed in each of two test tubes, and to one of the solutions 1 cc. of mucus was added, which was precipitated by the acid liquid—that is to say, the mucin was liberated. A wedge-shaped piece of dentin was now hung in each tube. The decalcification advanced somewhat more rapidly in the solution to which no mucus had been added.

I then prepared a precipitate of mucin from 70 cc. of ropy saliva by the addition of a solution containing 1 per cent. of lactic and 1 per cent. of acetic acid. The precipitate was washed and a sufficient amount of distilled water added to bring it to 5 cc. On the addition of ten drops of a 10 per cent. solution of ammonia the mucin dissolved to a slimy, transparent mass. Thereupon ten drops of a solution containing 2.5 per cent. of lactic and 2.5 per cent. of acetic acid were added until the reaction became slightly acid. The action of this solution (1) of freshly precipitated mucin I compared with that of the following solutions: (2) 2 cc. of a $\frac{1}{2}$ per cent. solution of lactic acid in water, (3) the same in saliva, (4) the same as 3 plus 1 cc. of mucus. To each solution 0.04 gm. of finely pulverized dentin from the tooth of a sperm-whale were added, the tubes were closed with rubber caps and put for half an hour in an apparatus that was revolving at the rate of twenty revolutions a minute, by which means the same contact of the dentin with the liquid was maintained in all the tubes.

The amounts of calcium salts dissolved in the different solutions estimated as CaO were as follows:

(1) 0.0010 (2) 0.0078 (3) 0.0082 (4) 0.0074

We see a minimal decalcification in the mucin solution which in part at least, if not altogether, is to be attributed to the action of the excess of lactic and acetic acid. We see also that the solution to which mucin had been added —(4)—dissolved a somewhat smaller amount of calcium salts than the solution without mucus—(3).

These are but a few of the many experiments which were carried out in all possible modifications and which have thoroughly convinced me that the action which Lohmann attributes to mucin in reality does not exist; and, in fact, such an action in the sense in which it is maintained by Lohmann is to me not conceivable. As a fact, I find that mucin which is precipitated by solutions containing weak acetic and lactic acid, *e.g.* 1 per cent., after being thoroughly washed shows but a *very* slight acid reaction, nor does it have any appreciable decalcifying action upon dentin.

It must furthermore not be forgotten that freshly precipitated mucus is subject to putrefaction, and that the products of the putrefaction may have an alkaline reaction. Lohmann recom-

mended the addition of sodium fluorid to prevent such decomposition, but what is there to take the part of fluorid in the mouth? and what prevents the freshly precipitated mucin in the mouth from undergoing decomposition and forming alkaline products which so far from injuring might even signify protection of the teeth?

Although the question of the agency of mucin in the causation of caries in the manner indicated by Lohmann may be considered as definitely disposed of in a negative sense, I followed out my line of experiments still farther. The mixed fluids of the mouth are made up chiefly of the secretion of the salivary glands. It seems desirable, however, that the secretion of the mucous glands and of the epithelium should be studied apart from the saliva. In the absence of any known method of obtaining this secretion in sufficient quantity I made use of the mucus secreted by the epithelium of the respiratory tract, which in the form of phlegm may easily be obtained, in catarrhal conditions, in sufficient quantities for purposes of examination. Naturally care must be taken by thoroughly cleansing the mouth beforehand that the phlegm does not become mixed with particles of food.

With this phlegm experiments were carried out analogous to those made with the mixed oral fluids and described above. These experiments gave the same results—namely, that the decalcifying action of any weak solution of organic acids is not increased by the addition of mucus in any form.

The following experiments may serve as an example:

(1) Phlegm 2 cc. + ferment fluid 2 cc.
(2) Water 2 " + " " 2 "
(3) " 2 " + " " 2 "
+ phlegm 1½

Wedge-shaped pieces of dentin suspended in these solutions showed the most decalcification in the second, the least in the third. A large number of experiments were made, nearly all leading to the same results. Occasionally only was the decalcifying action of the solution containing mucus as great as that of the solution in which no mucus was present. This might naturally be the case where the mucus had an acid reaction in the beginning, or where the quantity of acid added was so small that processes of fermentation could take place, leading to an increase in acidity.

Furthermore, mucin precipitated from phlegm by means of dilute organic acids and ferment liquids showed but a very weak acid reaction or when thoroughly washed was even neutral, and had either no action upon the dentin or so slight a one that it required weeks to bring about as much decalcification as one could obtain in mixtures of saliva with foodstuffs in a few hours. Even when mucin was but slightly washed it showed less action than the liquid from which it was precipitated.

In *résumé* of the results of all these experiments it must be affirmed that the hypothesis that the sole cause of decay of the teeth is to be found in the precipitation of mucin from the saliva by means of chance weak acids brought into the mouth with the food is theoretically, logically, and experimentally without foundation.

Having disposed of this phase of the problem, let us now consider the question whether the high percentage of mucin in the oral secretion forms an adjunct of any importance to the various causes of dental decay.

INFLUENCE OF MUCUS IN THE PRODUCTION OF CARIES.

There are few questions which occur more frequently in the literature on dental caries than that of the action of mucus on the teeth, and many writers of note, among them Wedl, Tomes, Magitot, and Taft have given expression to their view that mucus is an important agent in the production of dental caries. The belief is also very general that in mouths with thick, ropy saliva there is proportionally more caries than in those with thin saliva. Nevertheless we have never been able to come to an exact understanding or agreement on this point, nor are we

at present able to state to what extent or in what way the viscid or ropy character of the saliva is deleterious to the teeth. We all acknowledge that a large amount of mucus in the saliva is a hindrance to the proper cleansing of the teeth, and that it facilitates the precipitation of fine food particles upon the surface of the teeth, which may undergo fermentation, leading to the production of acids. Likewise the mucus itself as secreted by the glands of the mucous membrane often has an acid reaction, caused according to Kirk by the presence of acid phosphate of lime or soda, and some attribute erosion of the teeth, others decay at the necks of the teeth, to this fact.

General experience seems also to point to the conclusion that strongly viscid saliva is accompanied by much decay; and yet I am convinced that the deleterious action of the mucus is somewhat exaggerated.

Among the many patients whom I have examined with reference to this point I have found a number with intensely viscid saliva from which ropes a foot long could be drawn out, who were absolutely immune to decay, while I have found others who had scarcely a sound tooth in the mouth, whose saliva was almost absolutely free from mucus. Mucus may also be found in the saliva of many animals—for example, dogs—that in a wild condition do not suffer from caries, and Lohmann's assertion, that dogs suffer from caries on account of the mucus contained in their saliva is wrong both in point of fact and of logic, since it is only the house-dog, whose food is usually rich in carbohydrates, in which carious teeth have been found. The wild dog, as well as the fox, wolf, jackal, etc., as far as they have been examined show no caries. The mucin theory of caries accounts in no way for the fact that caries does not occur in races which live only on meat (Eskimos), and it is also well known that carnivorous animals (lions, tigers) do not suffer from caries.

The mucin theory furnishes also no explanation for the fact that caries is more frequent in the upper than in the lower jaw, nor does it explain why the lower front teeth which are constantly bathed in the secretion of the salivary glands that are richest in mucus—the sublingualis and submaxillaris—should be the least subject to caries of all the teeth. Also, the frequency of decay on the buccal surface of the upper third molar cannot be explained by the action of mucin.

Lohmann cites cases of caries of unerupted teeth as proofs of his mucin theory, and refers especially to a tooth which he sent me for examination. This tooth, however, as well as all teeth with supposed caries which I have examined, has turned out to be simply a case of resorption without a trace of caries. Likewise, in dermoid cysts up to the present time true caries has not been found.

In the present state of our knowledge we may undoubtedly say that a large percentage of mucus in the oral fluids may have a deleterious action upon the teeth—(1) in that it interferes with the process, either spontaneous or artificial, of cleansing the teeth; (2) in that it forms a good culture medium for bacteria; (3) in that it may have an acid reaction in virtue of the acid phosphates which it contains.

The mucus in the mixed oral fluids is derived from various sources. By far the greater part is formed by the salivary glands, the secretion of the sublingual and submaxillary containing a large percentage of mucus, while that of the parotis is nearly or quite free. In the second place the small mucous glands found in nearly all parts of the mucous membrane of the mouth secrete a mucus which has been supposed to have a particularly deleterious action, regarding which, however, we know very little. In the third place we have to do with the possibility that certain cells of the epithelium in the mouth may form mucus after the manner of the goblet cells found in the epithelium in the respiratory tract. We have, however, no positive proof of the secretion of mucus by isolated cells, and in particular, goblet cells have not, as far as I am aware, been

found in the mucous membrane of the mouth.

It appears now that the mucus obtained from different sources does not have the same composition. Lohmann cites Nerking to the effect that the mucus of the salivary glands contains 25 per cent. of carbohydrates, whereas the mucin obtained from the mucus of the respiratory tract furnishes 37 per cent. of carbohydrates (chitosamin, glycosamin) according to Fr. Müller.

Regarding the composition of the secretion of the mucous glands of the mouth little is known, and still less regarding that of the secretion which possibly may be furnished by the epithelium of the mouth.

The following experimental results seem to indicate that mucus from different sources may undergo different processes of decomposition, leading to the production of different substances. If we allow saliva containing much mucus to stand in the incubator, we shall find that in the course of twenty-four hours it takes on an alkaline reaction, or may remain neutral, while mucus from the respiratory tract in the same time becomes decidedly acid. This formation of acid seems to be the result of a process of fermentation of the carbohydrate constituents of the phlegm, and if we keep it in the refrigerator instead of the incubator, or prevent the fermentation by the addition of chloroform or ether no acid is produced.

If now the secretion of the mucous glands of the mouth or of the epithelium has the same or similar composition, it appears quite possible that it may likewise undergo a process of fermentation leading to the formation of acid. Such a process of fermentation may come into account as a factor in the production of caries, particularly in the night, where the salivary secretion ceases, or at points where the teeth are not constantly bathed in saliva. We might have here a possible explanation of certain cases of decay at the neck of the tooth. It is, however, far from my intention at present to look upon this possibility as an established fact. We have already so many theories of caries that I do not wish to increase the number by the addition of one which has not yet been thoroughly worked out.

The following experimental results seem, however, to lend support to the idea that an acid fermentation of mucus may take place. I suffer personally from caries at the neck of the teeth, having no less than three large cavities in the upper and five in the lower jaw, while all of my lower front teeth show a slight softening at the neck. Some of these teeth I have filled with gutta-percha, others I have left open, as I find them convenient subjects for experimentation. If now I thoroughly cleanse my mouth in the morning, a strip of blue litmus paper placed between the lip and the alveolar process an hour or two later will show a slight acid reaction. If the strips be then divided into halves and suspended in bottles kept perfectly moist by a few drops of distilled water in the bottom, the one placed in the refrigerator or dipped in a 5 per cent. solution of carbolic acid shows no change of color, the other placed in the incubator will become bright red in from two to three hours. Furthermore, if it be rolled together and pressed upon another piece of blue litmus paper, a bright red spot will appear; I have also been able to detect an acid smell. If the strip in the refrigerator be subsequently put in the incubator, it too will now turn red in the course of a few hours. This experiment I have repeated frequently, and always with the same result, which I am able to account for only on the supposition that the mucus secreted by my mucous glands or by the epithelium undergoes an acid fermentation, and possibly the caries at the necks of my teeth may be accounted for thereby.

I have not been able to test this matter sufficiently in the mouths of others for want of suitable cases. It is necessary, however, that other mouths be tested in order to determine whether or not we have here to do with a peculiarity of my buccal mucus which is not present in that of other persons.

THE CHEMISTRY OF PULP-DECOMPOSITION WITH REFERENCE TO THE DISCOLORATION PROBLEM; AND A RATIONAL METHOD OF TREATING THESE CONDITIONS.

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(Read before the Dental Society of the State of New York, at its annual meeting, Albany, May 12, 1905.)

IN directing the attention of this society to the subject of pulp-decomposition and its sequelæ, I desire to say at the outset that there are many difficulties presenting themselves to the student who attempts to study this complicated process from the chemical viewpoint, either for the purpose of solving the knotty problem of the discoloration of the teeth from this source, or for the purpose of outlining a rational treatment for the correction of the putrescent condition. Especially is this true of the investigator who is not satisfied to make his statements at second-hand, or who is not contented to advance theories from his unaided inner consciousness that cannot be substantiated by laboratory experimentation or confirmed by clinical observation.

It is my intention in this paper to discuss, first, the cause of the discoloration of teeth from pulp-decomposition; second, to outline a rational treatment for the correction of the putrescent condition, whereby the color of the tooth can be preserved. In those cases, however, where the color of the tooth is lost before the patient presents, I shall also outline a rational treatment for its restoration.

CHEMICAL CONSTITUENTS OF PULP TISSUE.

It is necessary in studying the chemistry involved in the process of pulp-decomposition to first ascertain the chemical constituents of the original pulp tissue. So far as chemists have been able to determine, practically all of the elements are present in the pulp tissue and its vascular supply that are found in any other animal tissue. These elements are arranged in different compounds which make up the pulp tissue, the proportion of which varies from other tissues, and this no doubt accounts for the histological difference between this and many of the other tissues of the body. However, from a general chemical examination of the tooth-pulp, we find it analogous, or nearly so, to all other animal tissue in that it is composed of nitrogenous and non-nitrogenous substances.

The nitrogenous substances are principally proteid or albuminous bodies, and these take the chief part in forming the solid tissue of the pulp and are found to a greater or less extent in the fluids of the chamber.

It is the putrefaction of these proteid substances with which we are largely concerned in studying the cause of tooth-discoloration as well as the treatment of these conditions; and while chemists have thus far been unable to construct a rational formula for the molecule of these compounds, they have approximated its composition; therefore we should familiarize ourselves with the elements which make up this complex proteid molecule. They are carbon, hydrogen, oxygen, nitrogen, surfur; and in some instances iron and phosphorus have been known to exist.

CHEMISTRY OF DISCOLORATION.

In order that you may follow me in a theory which I have previously advanced on the discoloration problem, and to

which I shall refer later on in this paper, I would have you remember here that the relative amount of nitrogen compared with sulfur found in the proteid molecule is 15 per cent. of the former to 0.3 per cent. of the latter.

The non-nitrogenous substances of the pulp tissue are carbohydrates and fats. With these compounds chemists are more intimately acquainted; for it is known that they are composed of the elements carbon, hydrogen, and oxygen, in definite chemical combinations. In the case of fats the proportion of these elements varies in the different compounds.

Now, I am well aware of the fact that there is a question in the minds of some investigators, whose opinions we must respect, as to whether or not fats actually exist in the original pulp tissue. I am of the opinion that they do so exist, although I have been forced to realize that this is a difficult matter to determine from purely chemical means. But, whether or not fats are an original constituent of the pulp tissue, it is well and proper to consider the presence of fatty compounds in treating putrescent pulps, for every observing dentist has noticed that a partially decomposed pulp, from all physical appearances at least, is of a fatty nature; and, furthermore, chemists have proved that fatty compounds are formed as end-products in the putrefaction of proteid substances.

In our reasoning, then, we shall consider that the living pulp tissue is composed, from a general chemical viewpoint, of proteids, carbohydrates, and fats. Now let us see what probable chemical changes take place when death of the pulp occurs and micro-organisms invade the dead tissue.

The decomposition of the pulp tissue is essentially an analytic process which takes place gradually. Conditions being favorable, the germs present first act upon the complex and unstable substances composing the original tissue, splitting them up into less complex compounds, many of which are capable of further analysis; and the process continues until simple and well-known compounds are the result.

For convenience in studying this subject, I shall arbitrarily divide the compounds resulting from this analytic process into two classes, intermediate and end products.

The intermediate products depend to an extent upon the character of the micro-organisms in the tissue, but it is safe to say that ptomains and amido-acids are formed. Among the ptomains thus produced are putrescin, $C_4H_{12}N_2$, cadaverin and neuridin, $C_5H_{14}N_2$, the last two named being isomeric as shown by the formula. It is well to remember that two of these ptomains, putrescin and cadaverin, are volatile liquids with a very disagreeable odor and of an exceedingly irritating character; and if, by instrumentation or otherwise, they are forced through the apices of the roots, septic pericementitis or perhaps an acute alveolar abscess will result.

Among the amido-acids formed are tyrosin, $C_6H_4OHC_2H_3(NH_2)\ CO_2H$, and leucin, $C_5H_{10}NH_2CO_2H$. These substances, wherever found, have practically the same physiologic properties and pathologic significance. They occur in the intestine during the digestion of proteids, and leucin is found in almost every cell of the body.* Pathologically, they are found in atheromatous cysts, in pus, abscesses, etc., as well as in a putrescent root-canal. I would have you remember here that these intermediate products are nitrogenous compounds from which ammonia, NH_3, is evolved by further putrefaction, and also that fats are one of the end products.

The chief end-products of pulp-decomposition, as has been known for a long time, are water, H_2O; carbon dioxid, CO_2; acetic acid, $HC_2H_3O_2$; ammonia, NH_3; hydogen sulfid, H_2S, and a semi-putrid substance consisting largely of fats, depending upon the extent to which the putrefactive process has progressed. Simultaneously with the decomposition of the pulp tissue proper, the dentinal fibrillæ are broken up, as are also the constituents of the blood; and the tubuli as well as the pulp-chamber and root-canals

* Simon's "Manual of Chemistry."

are filled with the end-products of the decomposition.

The principal gases generated by the putrefaction of the proteid substances, the main constituent of the original pulp tissue, are ammonia and hydrogen sulfid. Now, it is interesting and important to know which of these two chemically active gases is evolved in the greatest quantity. This is easily estimated when we recall the relative amount of nitrogen and sulfur found in the proteid molecule. As previously stated, there is approximately 15 per cent. of nitrogen to 0.3 per cent. of sulfur. It is quite evident, then, that hydrogen sulfid is not generated in a putrescent root-canal in such quantities as has been so generally supposed; yet this compound is a constant end-product and is important because it is an *acid* gas, with a disagreeable odor, having local irritating properties; and also because of the part it plays in the discoloration of tooth-structure. However, I must say here that while I realize hydrogen sulfid to be an active chemical agent, in my opinion it has been greatly overestimated as to the rôle it assumes in the discoloration of teeth from pulp-decomposition, as I shall now attempt to show.

HYDROGEN SULFID AND IRON FACTORS IN THE DISCOLORATION PROBLEM.

Before doing so, however, I desire to call your attention to one particular proteid substance found in the pulp tissue, as well as in other tissues of the body, and that is the hemoglobin of the red blood corpuscles. As is well known, this compound contains *iron,* which is not characteristic of all proteid bodies.

It is quite generally conceded by those who have given this phase of the subject their attention, that iron is the most important element to be considered in the many factors entering into the discoloration problem; and it is a common statement found in our text-books and journals that the discoloration is due to the formation of ferrous sulfid, FeS, which salt is supposed to be formed by the action of hydrogen sulfid upon the iron.

Dr. E. C. Kirk of Philadelphia, in the chapter on "Discolored Teeth and Their Treatment" ("American Text-book of Operative Dentistry," page 538), after attempting to account, in a very rational manner, for the immediate discoloration of teeth, the pulps of which have died as the result of some traumatic injury, says: "The process of putrefactive decomposition consists of a series of chemical changes wrought out through the agency of micro-organisms, involving the breaking down by successive stages of highly complex organic compounds and their resolution into compounds of much simpler constitution. It is not known to what extent this splitting up of the components of the pulp and its vascular elements is ultimately carried in the series of changes resulting in the permanent discoloration of the tooth. From what is known of the ultimate composition of the compounds involved, however, it may be safely inferred that, reduced to its lowest terms, the result will be the formation of iron sulfid, the elements of which, with the exception of some unimportant alkaline and earthy salts, are the only ones entering into the original compounds which are fixed and capable of forming a stable residuum in the tubular structure of the dentin."

In an abstract (DENTAL COSMOS, November 1903, page 906) of an article by Dr. Robert S. Booth of North Carolina, we find the following:

"When nitrogenous substances are deprived of their blood supply, their vitality disappears, and they undergo gangrenous decomposition. They are then invaded with micro-organisms, and the process causes the formation of numerous gases of a very foul odor. The principal gas found in a putrescent pulp-canal is hydrogen sulfid, and to this gas we may attribute most of the foul odor we so often have to contend with.

"Physiology teaches us that iron is present very largely in our systems and is distributed throughout the body by the red blood corpuscles, and in the case of a putrescent pulp these red blood cor-

puscles are broken up and iron is set free. This iron readily and rapidly unites with the hydrogen sulfid present; iron sulfid is formed, and this is one of the causes of the discoloration."

Dr. Kirk, in reviewing this article, says:

"We fully agree with the author in regard to the important part that the elements sulfur and iron play in the coloration of teeth. However, iron sulfid, as such, cannot be held wholly accountable for the bluish-black color of a tooth which has reached the stage of permanent discoloration. The pigmentation is almost entirely due either to it or to some allied compound in which iron and sulfur, with some organic constituents, largely enter, and which by a further slight decomposition would yield true iron sulfid."

In the treatment of putrescent conditions of the dental pulp, the author brings out a point deserving careful consideration. It is to the effect that "We should be very careful not to allow the pulp-chamber, after being opened, to stand open for any length of time. The sooner it is treated and healed, the less discoloration of the tooth there will be."

I desire to emphasize this latter statement found in Dr. Booth's paper; for it coincides with the clinical experience of every observing dentist; and yet it stands as an absolute refutation of the theory that the discoloration of teeth from this source is due to the formation of ferrous sulfid.

From chemistry we learn that ferrous sulfid is a *black* compound, and that no change takes place in the color or otherwise by exposing it to the air. Should the discoloration of tooth-structure be due, then, to ferrous sulfid, as claimed by Drs. Kirk, Booth, and many others, there would be no necessity, in treating putrescent pulps, so far as preserving the color of the tooth is concerned, for using a remedy which can be hermetically sealed within the tooth. Now, we all know that one of the advantages in hermetically sealing-in the remedy, in treating these cases, is that by so doing we *prevent the tooth from changing color.*

Dr. Kirk admits that "Iron sulfid, as such, cannot be held wholly accountable for the bluish-black color of a tooth which has reached the stage of permanent discoloration." And yet he says that "The pigmentation is almost entirely due either to it or to some allied compound in which iron and sulfur largely enter."

I might add here that the *green* or *yellow* discoloration of teeth cannot be attributed in any way to the presence of black ferrous sulfid; and while I believe it is possible for this compound to be formed in the ultimate process of pulp-decomposition, I do not believe it is produced by hydrogen sulfid acting directly upon the iron; neither do I believe the discoloration to be entirely due either to it or to some allied compound in which iron and sulfur largely enter. It is a fact, well known to every analytical chemist, that ferrous sulfid cannot be precipitated from either the ferrous or ferric solutions by an acid reagent, as hydrogen sulfid, and I do not believe a reaction possible within the tooth that cannot be verified in the laboratory with the same reagents. Clinical experience shows that a tooth containing a recently decomposed pulp, in a large percentage of cases, is not discolored. There is no perceptible change in the color until oxygen is admitted from the air or otherwise.

Dr. Elgin MaWhinney of Chicago, in his recent book on "Oral Pathology and Therapeutics," page 152, makes a somewhat different statement in regard to the cause of the discoloration of teeth from this source. He says: "The chemistry of the proteid molecules of all albuminous material, including pulp tissue, is not very well understood, but enough is known to furnish a rational explanation for tooth-discoloration resulting from the decomposition of the pulp tissue. The important elements in the composition of the proteid substance of the pulp tissue are carbon, oxygen, hydrogen, nitrogen, phosphorus, and sulfur; in the putrefactive decomposition of this tissue certain chemical compounds are formed, among which are carbon dioxid, ammonia, hydrogen sulfid, and water, none of

which in themselves caused the discoloration, but when hydrogen sulfid is brought in contact with hemoglobin in solution in the presence of oxygen, sulfo-methemoglobin is formed, resulting in a certain amount of ferrous sulfid and other iron salts being formed, and it is these that furnish the green, brown, and black colors when forced into the tubuli—at least they play a very important part in tooth-discoloration."

This statement of the cause of the discoloration is rather vague and indefinite; and, if chemically correct, does not furnish a rational solution of the problem; for there is no hemoglobin in solution or otherwise in a putrescent root-canal. When the putrefactive process has progressed sufficiently far for hydrogen sulfid to be formed, this proteid body (hemoglobin) has also been decomposed, it being broken up simultaneously with the other proteid compounds, and it is a very difficult matter, at this stage, to determine in just what form the iron exists. It depends entirely upon the affinity for iron possessed by the end-products thus far produced in the decomposition. Now, it would be interesting to know what "other iron salts" are formed, to which the author refers in making this statement. So far as my knowledge of the literature on this subject goes, this is the first intimation, outside of my own articles along this line of thought, with the discussions, reviews, and criticisms relating thereto, that it was possible for compounds of iron, other than ferrous sulfid, to be formed in the putrefactive decomposition of the pulp which are stable and capable of permanently staining the tooth green, black, and brown.

In articles which I read before the Odontographic Society of Chicago (*Dental Review,* June 1901, October 1902), I advanced a theory on the discoloration problem which at that time seemed plausible to me; and while some criticism has been offered, I am still of the opinion that this theory presents a rational solution of this question from both a chemical and clinical viewpoint. In calling your attention to this theory, I am going to take the liberty of quoting liberally from these articles.

We learn from studying the process of pulp-decomposition that ammonia is not only a constant end-product, but that it is generated in far greater quantities than any other gas. As is well known, ammonia has the property of uniting chemically with water, which is always present in a putrescent root-canal, forming ammonium hydroxid, $NH_3+H_2O=NH_4OH$. This reagent will precipitate the soluble salts of iron in both the ferrous and ferric forms, producing respectively ferrous and ferric hydroxid, $Fe(OH)_2$, $Fe_2(OH)_6$. Now, it is not only possible, but quite probable, that the atomic iron which is liberated in the process of decomposition from the hemoglobin, or perhaps intermediate compounds containing it, unites with the ammonium hydroxid present, forming the hydroxid of this metal; and inasmuch as the compounds containing the iron are organic or weak, the ferrous hydroxid, in all probability, would be produced. Ferrous hydroxid is a white compound which readily absorbs oxygen when in the moist state and exposed to air, and gradually changes to ferric hydroxid, a reddish-brown compound. In this change there is an array of four distinct colors—white, green, black, and brown—and in the blending of these four colors there is produced every variety of shades exhibited in the discolored teeth. Does not this explain in a plausible manner why teeth containing putrescent pulps change color when air is admitted?

I fully recognize the fact that ferrous hydroxid is not the only compound of iron capable of producing color changes when moist and exposed to air. Nearly all of the ferrous compounds change more or less; but with the possible exception of ferrous carbonate which could be formed, ferrous hydroxid is the only compound of iron possible to be produced, the color changes of which correspond to those seen in teeth which have reached the stage of permanent discoloration.

I have stated in this paper, as well as in others, that in my opinion it was possible for ferrous sulfid to be formed by

the putrefactive process; but it can only be produced by the hydrogen sulfid acting first upon the ammonia, forming ammonium sulfid: $H_2S+2NH_3=(NH_4)_2S$. And this *alkaline* reagent will always act upon the soluble salts of iron, precipitating the metal as ferrous sulfid.

My conclusions in the articles to which I have referred were that the permanent yellow discoloration was due to the formation of ferric hydroxid; the bluish-black discoloration to a mixture of ferric hydroxid and ferrous sulfid—or to a failure of the ferrous hydroxid to become completely oxidized into the ferric form owing to a lack of moisture or oxygen.

Dr. Kirk, in reviewing these articles, has given me credit for an ingenious line of chemical reasoning, but says that, in his opinion, I have not reckoned with all of the factors in the case. Like Dr. Kirk and all others who have written upon the subject, I have accepted the statement that iron plays the most important rôle of all the elements entering into the discoloration problem. Remove the hemoglobin from the blood, or the iron from the hemoglobin, and I do not believe the dentin can be discolored by any compound formed by the process of pulp-decomposition. If this be true, my reasoning is at least logical.

Having thus far discussed the *cause* of the discoloration of teeth from pulp-decomposition, as it appears to me, I now beg permission to direct your attention to the consideration of a rational method of treating these conditions, whereby the color can be preserved.

THE BLEACHING METHOD.

In outlining a rational treatment for these cases, it must be done with some knowledge of the conditions as they exist and as they are found in practice, without regard in the slightest degree to any cherished theories which we may have, unless the theories are based upon facts gleaned from studying the chemistry involved in the putrefactive process.

As previously stated, the intermediate product of the putrefaction of the proteid constituents of the pulp tissue are ptomains and amido-acids. Among the ptomains known to be formed are putrescin and cadaverin. The presence of these poisonous bases must be taken into consideration in correcting this condition; for it has been proved that both are capable of producing inflammation and suppuration. As the process of putrefaction goes on, the intermediate products are further putrefied, and ammonia or its derivatives are formed. This gas and hydrogen sulfid are the chief gases with which we have to contend; therefore it is necessary to chemically change these gases in order to preserve the color of the tooth as well as remove the putrescent condition.

Recognizing this fact, I suggested, in an article which I read before the Section on Chemistry at the Fourth International Dental Congress, held at St. Louis, August 1904 (Dental Cosmos, February 1905), the use of the following remedy:

℞—Formalini,
Tricresol, āā f3j. M.

Sig.—On a small pledget of cotton hermetically seal in the pulp-chamber for from twenty-four to forty-eight hours.

Formalin and tricresol are miscible in all proportions, and when mixed make a good pharmacal product, as well as an excellent germicidal remedy. It has been proved by bacteriological tests that the remedy will kill immediately the staphylococcus pyogenes albus—a germ which is as resistant to the action of chemical agents as any of the pyogenic bacteria. One of the advantages in using the remedy is that it constantly gives off formaldehyd gas, which unites chemically with the ammonia, forming urotropin, a solid: $4NH_4OH + 6CH_2O = (CH_2)_6N_4 + 10H_2O$. Thus we change the main gas formed in a putrescent root-canal into a solid which has disinfectant properties.

The formaldehyd also unites with the hydrogen sulfid, forming methyl alcohol and sulfur: $2H_2S + 2CH_2O = 2CH_3OH + S_2$.

By changing these gases into liquids and solids, we are able to hermetically seal-in the remedy. This prevents the saliva from contaminating the medicine

within the tooth and the medicine from contaminating the saliva in the patient's mouth. It also keeps the air from coming in contact with the contents of the pulp-chamber and root-canals, which has been recognized as a factor in preventing discoloration. It is stated on good authority, too, that formaldehyd unites chemically with basic ptomains, forming odorless compounds. By using formalin, then, from which we get formaldehyd gas, we dispose to advantage of the chief intermediate and end-products found in a putrescent canal with the possible exception of fats or fatty acids. It was for the purpose of disposing to advantage of these substances that tricresol was added to our remedy; for I believe this agent acts upon the fatty compounds, changing them into an agent resembling lysol—a good antiseptic. This statement is based upon the fact that lysol is practically a preparation of cresols dissolved in fat, and contains about fifty per cent. of cresols, of which there are three, metacresol, orthocresol, and paracresol. A refined mixture of these three cresols is known as tricresol (now recognized by the U. S. P. of 1900 as "cresol"); and this is the agent which I selected as the vehicle with which to dilute formalin.

Thus we can see that by hermetically sealing-in this remedy we convert the poisonous gases and liquids into non-poisonous liquids and solids which are in themselves antiseptic and germicidal in character.

In advocating the use of this valuable remedy, I desire to emphasize the necessity of always hermetically sealing it within the tooth. It is understood that the pulp-chamber should be freely opened, thus exposing the contents of the canals to the action of the remedy; and better results are obtained by sealing with a quick-setting cement, thereby avoiding pressure.

In those cases where there is not much odor, the original formula can be modified as follows:

℞—Formalini, f℥j;
Tricresol, f℥ij. M.
Sig.—Use as directed above.

It should be remembered that the value of formaldehyd in any remedy to be used in these cases depends upon the power this agent has of uniting chemically with the poisonous ptomains and irritating gases resulting from pulp-decomposition. Where these substances are not present, formaldehyd is contra-indicated.

CASES SUGGESTING THE USE OF Na_2O_2.

There now remains but one other phase of this subject for me to consider, and that is a method of restoring the color of the tooth in those cases where it is lost before the patient presents for treatment. This I shall do as briefly as possible; for I have perhaps already overtaxed your patience.

I have found sodium dioxid, Na_2O_2, the best agent at our command to use for this purpose; therefore I will outline a method of using this chemical.

In using sodium dioxid for bleaching purposes, the first thing to do is to test the efficiency of your powder. Many dentists have tried this method and failed to get satisfactory results because the chemical used was partially or nearly all decomposed. Exposure to moist air will decompose the powder. Realizing this difficulty, I suggested the following simple chemical test: Place about one gram of the powder into a clean, dry test tube, and add about one or two cubic centimeters of water. Enough oxygen should be generated to kindle a glowing splinter held at the mouth of the test tube. If the powder responds to the test, it is efficient and can be used, otherwise it should be rejected.

Having tested the chemical and found it efficient, we are ready to make the application.

The best results can be obtained by placing the powder in the cavity of the tooth to be bleached, and dropping distilled water on the powder. The water rapidly decomposes the sodium dioxid into sodium hydroxid and nascent oxygen, as $Na_2O_2 + H_2O = 2NaOH + O$.

The caustic soda creates an alkaline medium which has been recognized by

manufacturers in bleaching commercial products, such as wool, feathers, hair, ivory, etc., as favoring the bleaching process. The nascent oxygen changes the molecule of the colored pigments. I was formerly of the opinion that oxygen converted the ferrous sulfid, an insoluble compound, into ferrous sulfate, a soluble salt and easily removed. But this statement cannot be substantiated by laboratory experiments. Should this change take place, in the presence of caustic soda, the iron would at once be reprecipitated from the sulfate compound as ferrous hydroxid.

The action of oxygen upon ferrous or ferric hydroxid is to change these compounds into ferric oxid, Fe_2O_3, still an insoluble compound and capable of staining the dentin of the tooth. It can readily be seen, then, as clinical experience will prove, that we must depend largely upon the mechanical removal of the pigments from the tubular structure of the dentin, after chemically changing the colored molecule. Failure to remove the pigment has been the source of much of the rediscoloration with which we have had to contend. Therefore it is necessary to thoroughly wash the tooth with warm distilled water after each application of the bleaching agent. The dentin can then be treated with a two per cent. solution of sulfuric acid, H_2SO_4. This will convert the ferric oxid that may not have been mechanically removed into ferrous sulfate—a soluble salt and easily removed by again washing the tooth. When the tooth is satisfactorily bleached, the dentin can be protected as the operator deems best.

In recapitulation, then, I desire to say that I fully realize that the theory which I have advanced on the cause of the discoloration of teeth from pulp-decomposition has not been proved correct beyond the possibility of a doubt. I have been studying these conditions as they are, and I advanced this theory as my solution of the problem. At best, it is only a theory; as such I gave it to the profession. Not unlike all new theories, it has been criticized, and in one instance even to the point of ridicule. No honest searcher for facts, however, is afraid of just criticism. It is always welcome, and only serves as a stimulus for better work. A question naturally arises here as to whether or not theories are of any practical value.

Since I began the study of chemistry a few years ago, a theory has been advanced, in order to find a satisfactory explanation of electrolysis, which assumes that elementary atoms are in themselves charged electrically. At first, this theory was received with suspicion, others began to investigate along this line, and today it is accepted and is the basis of chemical teaching in our modern colleges. It is true that the discovery of radium has upset some of the theories in chemistry; but they served as good working propositions before this discovery was made.

Every careful and unbiased student, who has studied closely the process of pulp-decomposition, must admit that ferrous sulfid cannot be held accountable for all the various shades of tooth-discoloration. If some scientific investigator will go to work and prove that my theory is incorrect, and in so doing will discover the *true* cause of the discoloration, or even suggest a more plausible solution, I shall be happy, for my work will not have been in vain, and the profession which we love will thereby be greatly benefited.

INTERSTITIAL GINGIVITIS.

By EUGENE S. TALBOT, M.S., D.D.S., M.D., LL.D., Chicago, Ill.

(Read before the Massachusetts State Dental Society, at its annual meeting, Boston, Mass., June, 1905.)

THIRTY-FIVE years ago, while a dental student, it appeared to me that pathology was taught in a crude manner. There was no connection between the different diseases of the face, mouth, jaws, and teeth, or between these structures and other parts of the human body. There were many pathologic conditions of the mouth and teeth that could not be accounted for. Pathology must be studied and taught upon broader lines. It seemed to me that pathology would be a good subject for my life-work.

In my early reading, evolution became an interesting study. I reasoned that if man was the product of evolution, change in structure must also be accounted for in the same manner. The law of Aristotle, the law of economy of growth, whereby an organ or structure is lost for the benefit of the organism as a whole (struggle for existence between organs), or use and disuse of structures was a broad foundation upon which to study developmental pathology. Man to develop or evolute must grow in some directions and degenerate in others.

Reasoning in this way, it was not difficult to find that the central nervous system is pre-eminently the part of the body that is growing at the expense of the physical man. All physical structures, however, are not degenerating to the same degree. Environment has much to do with this law. There are some structures that so far as usefulness is concerned have already passed and only a trace is left. Thus the pineal eye, the vermiform appendix, the little toe, the false ribs, the little muscles of the ear, etc. Other structures are passing or degenerating, such as the face, nose, jaws, and teeth.

On account of disuse these structures are degenerating for the benefit of the brain. The brain presides over nutrition, and structures which do the most work get the most nourishment. Hence the lower jaw is better nourished than the upper. Structures that are degenerating or passing are transitory structures, and are more liable to disease than are healthy or developing structures. And hence, therefore, when from disease or other causes, nutrition is interfered with, the face, jaws, and teeth suffer. The change in the shape of the jaws, alveolar process, and teeth shows a marked degeneration. The dental arches are much smaller, the vaults are narrow and appear high. The alveolar processes are thin and long, the crowns of the teeth smaller, the roots longer, narrow, and closer together. The roots of the molars do not spread as much as those of former races. The alveolar process is doubly transitory. The eruption of two sets of teeth causes the alveolar process to develop and absorb twice, if the second set of teeth be lost. This makes the alveolar process doubly sensitive to the influence of disease.

The alveolar process is an end organ. An end organ is a structure through which the blood passes and is restricted in its return. There are a number of end organs in the human body, but physicians think the eye one of the most prominent. Hence disease or change in nutrition is more easily and quickly observed in the eye than in other structures. The alveolar process is, however, the most sensitive. The tooth so far as the process and its diseases are concerned is a foreign body; the bloodvessels extend to the root and stop. The bloodvessels extending through bone tissue are con-

ducted in a tortuous manner, thus interfering with its return. The arterial walls become diseased and stasis results.

The fact that the alveolar process, owing to its evolution and because it comes and goes twice in the life of man, is a doubly transitory structure. It is an end organ. It is atavistic in its nature, and because the peripheral arteries end in bone tissue and easily become diseased, it is the most sensitive structure in the human body. It is therefore a greater index to systemic disturbances than the human eye.

DIFFERENCE BETWEEN INTERSTITIAL GINGIVITIS AND PYORRHEA ALVEOLARIS.

What is interstitial gingivitis? What is pyorrhea alveolaris?

A first tooth erupts. That it may absorb the alveolar process to allow it to come through the tissues, it sets up an interstitial gingivitis. There is no pyorrhea.

A second tooth erupts. Interstitial gingivitis is set up to absorb the alveolar process. There is no pyorrhea alveolaris. Teeth are extracted, interstitial gingivitis is set up to produce absorption and fill the cavity with new bone. There is no pyorrhea alveolaris. Teeth are wedged to obtain room for filling; teeth are regulated; an interstitial gingivitis is set up. There is no pyorrhea alveolaris. Crowns and bridge work are inserted, the gold band is carried under the gum margin; interstitial gingivitis is set up. There is no pyorrhea alveolaris. One, two, three, or four roots carry a piece of bridge work containing two or ten crowns; the extra strain upon those roots sets up interstitial gingivitis. There is no pyorrhea alveolaris. Artificial dentures set up interstitial gingivitis There is no pyorrhea alveolaris. Tartar, foreign deposits, and local irritations about the teeth set up interstitial gingivitis. There is no pyorrhea alveolaris. A root is filled; some of the filling material extends beyond the end of the root, interstitial gingivitis is set up. There is no pyorrhea alveolaris.

These inflammations may continue for a lifetime or until the tooth has exfoliated; if there be no pus germs in the mouth, pyorrhea alveolaris cannot take place. Everyone has interstitial gingivitis; only about ten per cent. have pyorrhea alveolaris. Interstitial gingivitis is a disease; pyorrhea alveolaris is not a disease but the result of a disease. The two pathologic conditions are separate and distinct. In the study of the two conditions, the terms interstitial gingivitis and pyorrhea alveolaris should be used in their proper places.

In some of the lower vertebrates, some snakes, elephants, etc., there is a continuous shedding of teeth. Certain teeth develop, are used a short time, are lost, and new ones take their place. This is continuous throughout the life of the animal. Man has two sets of teeth; the first set is lost, and a second set takes its place. These in turn will be lost if he live long enough. As soon as the alveolar process has obtained its growth (in degenerates it commences much earlier) interstitial gingivitis sets up, and there is a gradual absorption of the bone from the start. Nature is trying to shed the second set of teeth. This process I have called osteomalacia, or senile absorption, and it is atavistic.

While the peridental membrane becomes inflamed in interstitial gingivitis, the alveolar process is the supreme structure first to be considered in this disease. Hence the reason little or no pain is experienced. Three forms of bone absorption enter into the destruction of the process—halisteresis, Volkmann's perforating-canal absorption, and osteoclasts.

This disease is found in all animals, especially wild animals in captivity. Both the house and the tramp dog are excellent animals in which to study it.

[A series of slides prepared from the mouths of dogs were here shown demonstrating osteomalacia or senile absorption.]

CAUSES WHICH AGGRAVATE INTERSTITIAL GINGIVITIS.

Having studied the terms and nature of the alveolar process, the subject of in-

terstitial gingivitis and pyorrhea alveolaris as found in the mouths of patients will be taken up.

The etiology of advanced stages of interstitial gingivitis are divided into local and constitutional. The local causes are anything and everything that will produce a local irritation. Many of these have already been enumerated. The constitutional causes are those conditions of the system which cause and prevent proper elimination—viz, diseases, gastro-intestinal fermentation, drug and metal poisons, extreme changes from heat to cold and *vice versa,* and pregnancy. The lungs, skin, bowels, and kidneys are the four great eliminating organs. In disease some one or all of these organs are involved; if any one of them become diseased, faulty elimination and auto-intoxication result. Gastro-intestinal fermentation is the great cause of interstitial gingivitis due to faulty elimination and auto-intoxication. Drug and metal poisons act direct upon the alveolar process through the blood stream and nervous system.

Sidney Kuh and others have demonstrated that in most diseases, especially in gout and rheumatism, the peripheral nerves become diseased. I have demonstrated nerve-end degeneration in the pulp. In auto-intoxication the blood becomes poisoned, thus setting up irritation in the capillaries. Again, the irritation in the blood due to auto-intoxication produces a strain upon the heart. The heart, forcing the blood with greater energy, causes the arterial walls and capillaries to dilate, again setting up irritation and inflammation in bone tissue. Finally the coats of the arteries weaken and arterio-sclerosis results.

[The pathology was here demonstrated by slides thrown upon the screen prepared from various diseased tissues of the dog, the monkey, and of man.]

TREATMENT.

If the disease be due to local causes the removal of the cause and local treatment will generally be all that is necessary. The removal of deposits and the application of iodo-glycerole every other day with vigorous gum massage will soon reduce and restore the gum and alveolar process to a healthy condition.

When teeth become loose, they should be fastened to other solid teeth to preserve them as long as possible and to prevent movement from extending the inflammatory process to adjoining teeth. When the disease is due to constitutional causes, the removal of deposits, bleeding the parts thoroughly, and the free use of iodo-glycerole and gum massage, will improve the tissue for the time, but will not make a permanent cure.

Interstitial gingivitis due to constitutional causes is a different condition and requires altogether different procedure. The local treatment is the same. If the patient has tuberculosis, syphilis, asthma, chronic constipation, gastro-intestinal fermentation, nephritis, etc., the dentist will be competent to treat these diseases or send the patient to the specialist. He should have the urine examined, since this is the only way of getting at the patient's general condition. For this purpose twenty-four hours' urine should be obtained and a part of it examined. This is necessary because urine voided at different hours of the day is never uniform. It is also essential to know how much urine is voided in twenty-four hours. The following should be noted: The specific gravity, degree of acidity, color, odor, albumin, sugar, blood, bile, casts, cells, amount of urea, and especially of indican. This will indicate whether gastro-intestinal fermentation is present or not.

The patient should be treated in the same manner as though he was to undergo a surgical operation. The system should be thoroughly cleansed of all impurities. All the excretory organs should be put in proper order.

There is no one condition of the body, outside of diseased excretory organs, that makes such a deep impression upon the alveolar process as indicanuria. To all appearances the patient is well except slight indigestion. Yet indican in the urine denotes the origin of grave symptoms. It is here that the dentist has the

advantage over the physician; he is able by observing interstitial gingivitis and marked absorption of the alveolar process to forewarn his patient of more serious difficulties in store for him long before the physician is aware of approaching trouble. Indeed, many times has the family physician given a patient a clean bill of health when I knew from these and other symptoms that grave diseases would—and they did—soon follow.*

Indican or indigo in the urine is by no means a rare product. Application of chemic tests indicate its presence, especially if the urine be turbid and of a greenish blue color. This substance always indicates profound intestinal fermentation. In diseases such as typhoid fever, cholera, nervous diseases, etc., it is quite marked. It is believed to be due to albuminoid putrefaction.†

For this purpose the saline cathartics are the best, followed by intestinal antiseptics. The kidneys and blood should be flushed with from eight to twelve glasses of water a day. Turkish baths once or twice a week, plenty of outdoor exercise, and proper diet. This together with the local treatment will restore the patient. All loose teeth should be fastened or removed; if they are allowed to remain the movement extends the inflammation to adjoining teeth to their detriment.

Those suffering from tuberculosis, syphilis, kidney lesions, etc., will improve or grow worse according to the status of the disease.

The formula for iodo-glycerol is:

Zinc iodid,	15 gm.
Water,	10 "
Iodin,	25 "
Glycerin,	50 "

This will make about two fluid ounces. It should be applied with an orange-wood stick wound around with cotton; the lingual surface of the gums on the lower jaw first, then the palatal surface of the upper jaw. After these surfaces have dried, have the patient close the teeth, and then paint first the buccal and labial gums of the lower jaw and afterward those of the upper.

The difficulty in getting this preparation properly prepared is that very few druggists have zinc iodid in stock. It would be a good plan for dentists to have some one reliable druggist in a town or city make this in quantity and keep it on hand. The dentist can then order it in quantities to suit his own convenience.

A NEW METHOD OF REMOVABLE BRIDGE WORK.

By F. L. FOSSUME, D.D.S., New York, N. Y.

(Read before the Connecticut State Dental Association, at its annual meeting, New Haven, Conn., April 18, 1905.)

IN this short paper, which I may have condensed too much, I wish to present to you a method of removable bridge work which has been carefully considered, tried, and found good.

FUNDAMENTAL REQUIREMENTS OF BRIDGE CONSTRUCTION.

The fundamental requirements of bridge work in a general way are utility, esthetic appearance, and cleanliness. The requirement of utility is fulfilled by stationary bridge work. Esthetic appearance often requires the restoration of contour by artificial gum tissue, and

* I have in preparation a paper upon "Gastro-intestinal Fermentation," in which I take up this subject at greater length.

† The study and treatment of indicanuria began in 1902.

in order to meet the third requirement—that of cleanliness—we are obliged to resort in such cases to removable bridge work. Now, all bridge work to fulfil the first requirement—that of utility—must be built on abutments which are able to support the strain. The recognition of this fact and the difficulties in many instances of its attainment in removable bridge work often cause us to abandon the idea of removable bridge work in cases where it otherwise would be highly desirable. The desirability of a system of removable bridge work making feasible in the largest number of cases the fulfilment of all requirements has occupied my own mind, and I believe that I have solved the problem.

If the abutments or pillars supporting the bridge can be made at all times to support one another they will stand many times the stress which otherwise would loosen them or move them out of relation. The recognition of this fact which prevails in stationary bridge work has led me to consider the possibility of intersupport and the maintenance of rigidity of abutments by a stationary bar uniting the abutments. Two cases which I will describe where I was compelled to abandon the idea of bridge work or else to construct it on unusual principles will illustrate my solution. As you will see from the models (see Figs. 1 and 2), on which are duplicates of the bridge work which the patient is wearing at present, the four upper incisors and all the lower molars with the exception of one are missing, and so the entire pressure of occlusion was brought upon the upper bicuspids and canines, and in consequence these teeth had become loose. The gum and the alveolus had absorbed considerably and the upper lip had sunk backward. A stationary bridge was out of the question on account of the large gum-piece that had to be supplied, and Griswold springs or split pins were inadequate under the circumstances, having to be anchored to loose teeth.

A NOVEL BRIDGE.

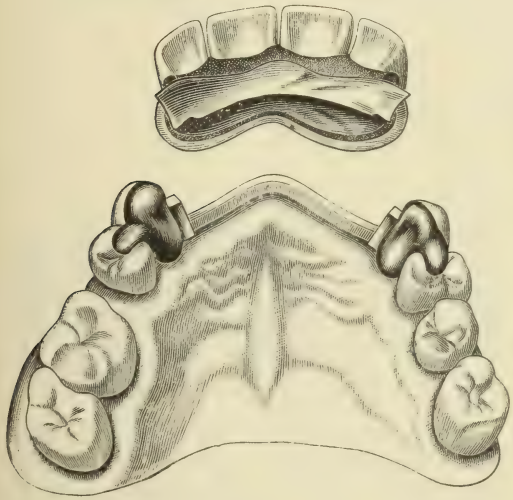
After carefully studying the case, I decided to try something on the principle of the splints for loose teeth which I have used for many years with great success. The canines and bicuspids were devitalized and the apical foramina sealed, and posts of platino-iridium wire constructed for the root-canals. Gold plate 24-karat, No. 36 gage, was burnished over the palatal surfaces of the canines, and through this gold the platinum posts, which already fitted the canals, were forced. A little hard wax tacked the posts and gold together, which were now withdrawn, invested, and soldered together; the pure gold covering being heavily reinforced. As the bicuspids had large mesio-occlusal cavities the pulps were removed through these and the gold was burnished into the cavities with posts in the roots as before, actually making cast gold fillings with posts running into the root-canals. All these pieces were then inserted into their respective teeth and a plaster impression taken. The pieces were then removed from the teeth, put into the plaster impression, and a cast obtained.

On this cast the canine and bicuspid attachments for either side were soldered together, then reinserted into the teeth, and another plaster impression was taken. Upon this new cast I fitted the platino-iridium bar connecting the right and left attachments, and soldered it to these. The whole piece was again inserted into the mouth and another impression was taken, upon which model was swaged a platinum piece fitting perfectly over the bar and alveolar ridge. A carved block of four teeth was then attached to the platinum covering by vulcanized rubber. Gold clasps had previously been soldered to the platinum covering to assist in holding the removable bridge-piece firmly in position. (Fig. 1.)

While I have minutely described the process of restoring the teeth in this difficult case, it is evident that the key to the whole construction, and its real novelty, is the bar which remains in the mouth when the bridge is removed, connecting the attachments of the piers, holding these firmly in place and preventing any spreading apart or contraction, and giving a solid foundation to the removable

piece. This applies to any bridge to be constructed. Take, for instance, where a lower bridge is to be made between third molar and canine, a gold cap may serve as the attachment on the back tooth, and any other appropriate form of attachment can be used on the front tooth and the bar soldered between them, and a removable piece constructed thereon. (Figs. 2 and 3.)

FIG. 1.



There are, of course, many other variations where it may be applied, from a one-tooth bridge to one including the entire fourteen teeth, but all are necessarily based on the solid bar which connects the attachments on the abutments. As to securing the removable pieces in place, any of our modern attachments, can be used just as the individual case may require, and there need be no danger of it falling out, choking the patient, etc. The bar supports the bridge from end to end, so there is no rocking or other movement if it fits properly, even without clamps or springs, except that without some such retaining device it might slide out of its place.

FIG. 3.

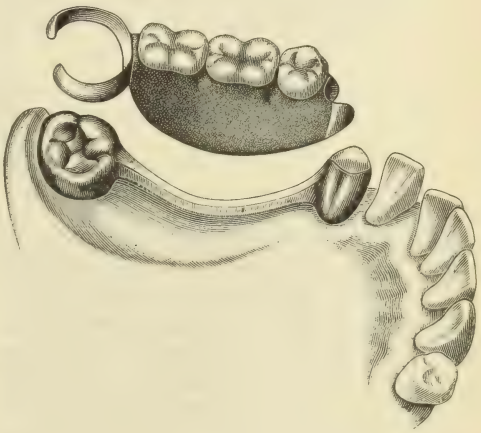


Vertical cross-section of bridge

AN ILLUSTRATIVE CASE.

I hand you another model; it is my first case of this kind and is instructive and interesting on account of its being an instant success and from the novel manner in which the removable piece is clasped in place. The bridge carries eight teeth, six incisors and the two right bicuspids. The abutments are the roots of the left lateral and the right canine. For these, Richmond caps with posts were made, and the bar soldered on top close to the palatal edge of the caps. The bar was not allowed to extend close to the teeth approximating either side, because a short cross-piece, as shown on the model, is soldered to each end of the main bar at this point. This part of the work being finished, it was placed on the roots in the mouth and a plaster impression was taken into which the bar with caps was placed. Upon the model obtained a platinum piece was now swaged as in the first case, and to this platinum base at each end, right over the short

FIG. 2.



cross-pieces, two pieces of clasp metal were soldered and bent so as to slip over and hug against the cross-pieces. By bending these slightly more when the piece was finished, they snapped over the cross-pieces, locking the removable piece securely in place, and it has not been necessary to make any adjustments since the time of its completion on January 7th last.

The teeth on the removable pieces which are shown here are attached with rubber, but of course porcelain or all-metal bridges can also be used. The carved block and swaging was made by the Stowe & Eddy laboratory.

A PRACTICAL CASE OF REPLANTATION WITH PORCELAIN RESTORATION OF CROWN AND PART OF ROOT.

By OTTO J. FRUTH M.D., D.M.D., St. Louis, Mo.

(Clinic at the Fourth International Dental Congress, St. Louis, Mo., August 31, 1904.)

MR. L. A. S., twenty-eight years of age, presented himself at my office on February 16, 1904, with the left side of the face very badly swollen and the left eye nearly closed. Upon examination I found that the upper left second bicuspid tooth was fractured obliquely, bucco-lingually, involving about two-thirds of this bifurcated root, and was the cause of the alveolar abscess. It was impossible to reunite the fragments, so the root was extracted and the cavity allowed to drain, there being considerable pus present. The cavity was thoroughly syringed and left open until the next day, when the cavity was packed with gauze saturated with an antiseptic solution. Edema of the face was still pronounced, but grew less after a few days. The gauze packing was renewed every other day and the edges of the wound were kept fresh until March 22, 1904, when the piece of root was replanted after having mounted upon it a porcelain crown and a portion of root. The implanted tooth was ligated to the adjoining first molar and bicuspid, and the gums were treated with tincture of iodin. There was some soreness for about two days, *i.e.* whenever the patient bit on the tooth, but this disappeared altogether later. On the 27th of April the silk ligature tore and came loose, when the patient removed the entire ligature unknown to me. I again saw the patient, outside of my office, and he reported that the tooth felt comfortable, and that he could not distinguish it from the rest of his teeth, but did not tell me that he had removed the ligature.

He again called at my office on June 9th by appointment, when I found the tooth quite firm and the gums in a very healthy condition, although the tooth was slightly rotated from its original position, in which there was perfect occlusion; however, this does not interfere with mastication in the least, as he chews as well on the left side of his jaw as on the right, and today [October 20, 1905] the tooth is as firm as any tooth in his jaw.

The patient is robust and in the best of health, which naturally aided the process of repair to a very great extent.

CONSTRUCTION OF RESTORATION.

When the two fragments were extracted, great care was taken not to injure the peridental membrane. After having been extracted the pieces were put together and measurements taken of the whole tooth, and also a sketch made of the crown, which was used as a guide in building up the porcelain restoration. The root was then trimmed with car-

borundum stones and disks to the shape shown in Fig. 1.

The root-canals were then thoroughly cleaned and reamed out, and filled to the apices with gutta-percha. The apices of the roots were rounded off and polished.

Porcelain was then added and baked, and afterward more was added and contoured to conform to the original tooth.

After this was finished, the crown and root were cemented to the piece of root, and after having set the thin platinum

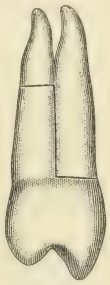
Fig. 1.



Fig. 2.



Fig. 3.



A piece of pure platinum, gage No. 37, was then thoroughly burnished over the coronal end of the root, and two iridio-platinum posts were forced through the platinum and down into the roots. A porcelain facing of proper shade was then soldered to the post, as in Fig. 2.

foil was burnished over the joint of the root. When completed it had the appearance of the sketch, Fig. 3, after which it was replanted, the socket of the root having been thoroughly sterilized, as was also the root before being put in its original position.

THE INFLUENCE OF MASTICATION UPON THE TEETH.

By HORACE L. HOWE, D.M.D., Boston, Mass.

(Read before the Massachusetts State Dental Society, at its annual meeting, Boston, Mass., June 9, 1905.)

THAT each component part of the body is affected by the general health is a fact that is being shown more clearly each year. That the teeth and adjoining tissues are influenced by the mode of living is a fact that has long been known to the dental profession in a vague sort of way.

To show that this idea is nothing new, I will quote the following from a book upon the "Management of the Teeth" written by Benjamin James, M.M.S.S., in 1814, who said: "The farther we depart from nature, or the more we indulge in the luxuries of the table, in the same proportion do our teeth suffer. That curse to civilized man, the toothache, has not even a nominal existence in savage life. Though he is too proud to take lessons from the monkey or Hottentot, he has humiliating reasons for envying them their exemption from disease." This, although written nearly one hundred years ago, shows that some men of that time had sound ideas regarding the cause of the affections of the teeth.

We know that "the more we indulge in the luxuries of the table," or the more civilization advances, general diseases in-

crease in corresponding proportion. Nervous and mental diseases that were unknown years ago are now common.

Our resources for treating diseases, to be sure, have increased with the needs, but unless the cause of disease be removed we can never hope for a permanent cure, and will still continue to treat but the local expressions of general trouble.

If the natural processes of digestion and nutrition were perfectly performed, we should undoubtedly be free from general disease, and likewise from diseases of the teeth. This ideal way of living, you will say, is impossible under the existing conditions of civilization. Perhaps this is true; but we do know that the nearer we approach the ideal, the better shall we be in all respects. We shall feel better, sleep better, work better, and think better.

As far as health is concerned we can learn a great deal by studying the habits of animals. They, when in their natural state, enjoy good health; undoubtedly they have their troubles, for not an animal is without its enemy, but instinct seems to show them, in a great degree, how to care for their health. For instance, an animal, when injured or sick, will crawl into an out-of-the-way place and remain there, without food, until the fever goes down and he is able to go about, or dies. If food be placed before the sick animal he will not eat.

We all have noticed dogs eat grass as an emetic in order to get rid of food that has disagreed with them. Birds have been known to set their broken legs with splints of grass and clay or saliva.

But the more we domesticate animals, and the more we force them to live artificially, in the same proportion do they become subject to disease—the very same diseases, in many cases, with which the human race is afflicted. For example, the monkey in its wild state is never troubled with consumption; but when caged, carried to another climate, and fed upon different food, he often dies of this disease.

Cattle kept in the open and left to themselves are seldom troubled with disease; when domesticated, however, and kept in barns, fed upon ensilage, prepared grains, and food of similar nature they have tuberculosis, inflammation of the bowels, and other diseases.

Dogs and cats when given freedom seem to live healthy and contented lives. Did you ever think of the contentment expressed by a cat basking in the sun, or of the happiness of a dog when he meets again an old friend? But when dogs and cats are kept indoors and fed rich and highly seasoned food, as is often the case in the large cities, they have consumption, poor and irregular teeth, and many of the other ills with which their misguided mistresses are troubled. Neither are they unlike their keepers in having their visits from the doctor, who does his best to stimulate and patch up the over-burdened digestive apparatus.

These facts, while they prove nothing, are useful for comparison. Animals in their natural condition have simple food, fresh air, and exercise, the three great factors concerned in health. Of these three factors civilization has modified none more than food and the manner of eating. Therefore we can perhaps justly place the cause of many diseases to this factor that has been so much changed.

It is true that competition today is mental instead of physical competition, as was the case in the prehistoric past; but our nerves and minds, as well as our muscles, are dependent upon nutrition. If we changed our food and manner of eating to suit our needs we can reasonably expect a change for the better. Such has been shown to be the case.

That it is possible to improve the general health, thus increasing the powers of the individual for resisting disease, by the thorough mouth-treatment of food has been proved beyond doubt by Mr. Horace Fletcher and others at Yale University and elsewhere. Severe tests made upon Mr. Fletcher and the twenty-five men from the United States army by thoroughly scientific men proves the fact beyond dispute.

Because of the thorough mastication of

food, it was noticed that after a time the appetite called for simple food, and the total amount required for all needs was reduced surprisingly. It was also noticed, as a result, that digestion and assimilation were improved, and the body, unimpaired by injurious waste products, was able to perform all its functions in a better manner. For a detailed account of these interesting facts I will refer you to the books by Mr. Fletcher and the reports by Professor Chittenden.

These facts being proved, the question arises, Why does the simple act of mastication make such a wonderful change in the health? When we know that mastication increases the amount of saliva and *changes the chemical reaction and composition entirely,* I think that the explanation then becomes as simple as the fact itself.

To fully appreciate the importance of the saliva it is necessary to make a study of its variations and its uses. By so doing we find that this fluid is normally neutral or slightly alkaline. The reaction is subject to many changes, however—for mastication, even though we chew but rubber, causes the saliva to change from a neutral or even acid condition to an alkaline reaction. This degree of alkalinity is increased if food and mastication both become factors of stimulation.

Anstie's law, *i.e.* "Glands excreting alkaline fluids are stimulated by the presence of acids, and the reverse," teaches us that acids would stimulate the salivary glands.

It is not surprising, therefore, to find that all our solid food is acid, the salivary glands thus receiving their natural stimulation. When food is masticated, and thoroughly insalivated, it becomes changed to an alkaline mass, and as such it is swallowed and passes to the stomach, and from its being in an alkaline state provides the proper stimulants for the acid-excreting gastric glands. All the digestive fluids alternate in reaction, *i.e.* the saliva is alkaline, gastric juice acid, and so on.

For a moment let us trace food that is not properly insalivated. All the richer foods are more acid than the simpler vegetable foods.

If this rich and strongly acid food be bolted and washed down with coffee or beer—these are often acid—the saliva does not have a chance to change the starchy materials to grape sugar. Neither is the acid reaction of the food changed by the alkaline saliva, but the whole mass goes into the stomach in an acid condition, thus depriving the gastric glands of their natural stimulation. The result is that after a time the stomach becomes simply a reservoir for ingested food, and does not do its share of digestion. We all know that nature will accommodate herself remarkably well to existing conditions, but long abuse is sure to be manifested in disease of some part.

The variations of the saliva that we will next consider are its variations toward acidity.

Dr. Michaels of Paris and others have observed that when the blood becomes of a lessened degree of alkalinity, because of the accumulation of acid waste products not eliminated from the system, the secretions and excretions of glands become of acid reaction. This is a very important observation, and to me explains in a very satisfactory way the acid reaction of the saliva in many cases. That the saliva fluctuates with the general health and condition of the system is, without a doubt, true. That there seems to be a correlation between diseased conditions of all kinds and hyperacidity of the system, and as a result hyperacidity of the saliva, with its effects upon the stomach, blood, and teeth, is also doubtless true. When we consider that, normally, three pounds or more of saliva is excreted and then reabsorbed in a day, is it a wonder that trouble comes when the first principle of nutrition is ignored? Every process of nutrition is dependent to a great degree upon the previous process being properly performed. I believe there is no panacea for all ills, but I do think that as far as medicines for indigestion, sour stomach, and doubtless many other diseases are concerned, the best general remedy is nature's own—normal saliva.

I have observed that in my own case

and in a great many other cases that the more this first step is neglected, in the same proportion, as a rule, do diseases increase, providing the balance of health be not maintained by modifying the two other great factors, *i.e.* the character of the food itself, and exercise. It would, indeed, be unreasonable to ignore these other two so important factors. For have we not seven miles of perspiration ducts for a purpose? The excess of fatty acids, uric acid to some extent, and many other waste products are eliminated by the skin in perspiration.

Again the nature of our food may be modified to suit our needs, depending upon habits and occupations. That people eat too much has long been known. In fact, Hippocrates, the Father of Medicine, who was born in 460 B.C., said in one of his aphorisms, "Excess of food produces disease, and at the same time points out the remedy." Take away the excess of food and I believe we have the best remedy today for many diseases, including those of the teeth and adjoining tissues.

Evolution and the law of economy of growth teach us that if the teeth are not needed they will not be erupted, or developed. Use stimulates growth and development, and, *vice versa*, disuse tends toward lack of development and atrophy. If the jaws be used in obtaining nourishment when very young the child will erupt the temporary teeth. If the temporary teeth be used for chewing thoroughly the food taken, this very process stimulates the flow of blood to the parts, and promotes the development and eruption of the permanent teeth.

Dr. Campbell of London, England, very reasonably points out that adenoids and resulting evils—among them irregular teeth—are caused by non-stimulation of the blood to these parts, because of lack of use of the muscles of mastication.

Pyorrhea alveolaris is a disease that we have all noticed is associated with people of the so-called "general uric acid diathesis." They have present also expressions of general acidity of their system by other diseases, such as rheumatism, gout, etc. As deposits of calcium salts are made in their movable joints, why not around their teeth? The attachments of the teeth are recognized as true joints. That erosion of teeth occurs in most cases where there is an over-acid condition present I have found to be the case. The mucous glands about the lips are very numerous, and if they pour out an abnormally acid fluid why should it not disintegrate the teeth, especially when this fluid does not become neutralized by the parotid saliva? Again, I have observed that children that are much troubled with sour stomach are apt to have present the soft white and rapid decay so destructive to the teeth.

To sum up: In order to eradicate the cause of the diseased conditions of the teeth and gums it is necessary to go farther than the particular tooth under observation, and to consider the general condition of the health. To improve the general condition, the most logical remedy in a great many cases seems to be the saliva, the natural neutralizing fluid of the system. As the saliva becomes a much more powerful neutralizing agent by mastication, why ought we not to give this first step of digestion its just consideration?

In regard to Mr. Fletcher and his work, I will say that he is doing a work for humanity that up to his time was left undone. As you all, perhaps, know, Mr. Fletcher cured himself of a bad state of malnutrition by strict attention to the mastication of his food.

That he, as well as myself and many others, have been benefited by so doing is beyond dispute. His criticizers say that he is an extremist, placing too much importance upon the function of mastication, and that some people have done themselves harm by thinking too much about their nutrition. Whether this last evil will overbalance the good effects, time alone can be the judge. I will say, however, that it takes big "cranks" to turn the world; and to my mind the people of the civilized world today need turning in respect to their habits of eating.

A NEW SYSTEM OF CROWN AND BRIDGE WORK.

By GEO. A. LOUQUE, D.D.S., New Orleans, La.

(Clinic at the Fourth International Dental Congress, St. Louis, Mo., August 31, 1904.)

A SIDE view of an artificial bicuspid porcelain tooth is here shown (see Fig. 1), provided with a concave or saddle-shape cervical end, so as to better rest on the gums and thereby conduce to the strength of the bridge and the comfort of the patient. It is also provided with a transverse aperture from one of its sides to the other, having a platinum tube baked into the bore of the tooth, as indicated by the letter *a*.

Fig. 1.

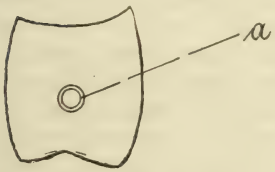


Fig. 2.

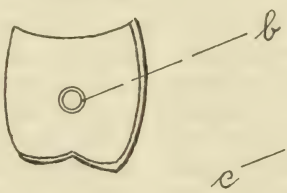


Fig. 3.

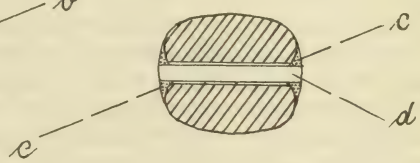


Fig. 4.

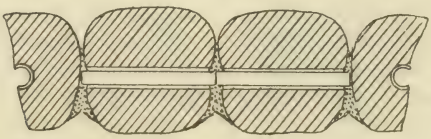


Fig. 5.

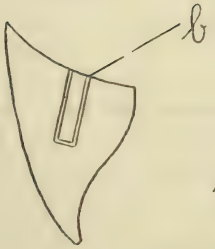


Fig. 6.

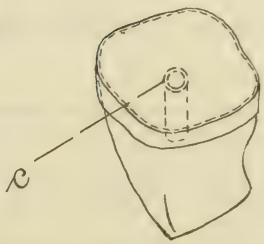


Fig. 7.



In putting up a bridge with these teeth, they are ground and fitted to the model in the usual manner. The tooth is slightly countersunk on the approximal surfaces, in order to afford more room for the solder to flow in and around the ends of the rod, which is placed in the tube as shown at *c* in Fig. 3. Platinum foil is burnished close to the tooth at the sides and back, leaving the front cervical end and the grinding surface open, as shown by Fig. 2. This done, holes are forced through the backing on both sides of the tooth (Fig. 2, *b*), and in consequence the platinum foil laps over the ends of the platinum tube—this in order to effectually prevent the borax or flux from coming into contact with and injuring the porcelain when soldering. An

iridio-platinum wire is placed in the tube, *b*, so that it projects beyond the backing at the sides of the tooth, as shown at *d*, Fig. 3, and the whole is invested. Gold solder, 22-karat, is applied to the opposite sides of the metal-covered tooth so as to cover the projecting portion of the rod, as indicated by *c*, Fig. 3. The investment is made very hot prior to the application of the blaze to the solder, so that the solder will flow freely in the tube, over the rod and backing.

Fig. 4 shows a bridge of two teeth attached to two crowns. After the backing and rod are soldered, the teeth are placed on the articulator, invested, and are soldered into one piece by applying solder between each bridge tooth and the crown. After the teeth are soldered together, the platinum backing at the palatal or lingual side of each tooth is preferably removed—this in order to render the bridge smooth at the back, clear of all metal, giving the bridge a more natural appearance and having no metal exposed.

A dental bridge constructed in the manner described may be soldered or otherwise connected to abutments of different kinds, stationary or removable.

Fig. 5 shows an incisor crown, having a central aperture in its cervical end, occupied by a platinum tube, *b*, baked in the aperture. Prior to connecting the crown to the root-cap and pin the crown is ground and fitted over the cap on the articulator the same as for any facing, after which a backing of platinum foil is burnished on the cervical end of the tooth and caused to lap over the sides and back, as indicated by Fig. 6. A hole is then forced in the layer *c* coincident with the tube. This done, a rod of iridio-platinum is placed in the tube with borax upon it. The tooth is invested point down in plaster and a small amount of 22-karat gold solder is melted over the rod so as to strongly connect the tube and rod to the backing. When cold, place and adjust the crown over the cap on the articulator, wax, invest, and solder cap and crown together as shown in Fig. 7, and finish the work as usual.

Having no pins in the way when grinding, and having no cement attachment, makes this a superior and most desirable method. It will be observed that all of the gold utilized is practically covered by the teeth.

For a close bite, these crowns can be used to great advantage over a saddle in bridge work.

THE ADHESIVE FILLING.

By JOSEPH HEAD, M.D., D.D.S., Philadelphia, Pa.

(Read before the Connecticut State Dental Association, at its annual convention, New Haven, Conn., April 18, 1905.)

SEVERAL well-known authorities on operative dentistry have asserted that if a gold filling be carefully inserted in a properly prepared cavity it will never prove a failure. How they can say this in the light of the obvious fact that a perfect tooth will decay or may be broken by a chance bite is incomprehensible. Even if they mean that nine out of ten conscientiously inserted gold fillings are carried to the grave or remain in position until the tooth falls out from senile recession of the gum, facts will hardly bare out their contention. Any future speculator who digs up a graveyard hoping to realize on the large amount of gold yearly used for filling teeth will be doomed to disappointment, as most of these fillings find their way, not to the grave, but to scrap gold of the dentist's drawer.

Why is a gold filling twenty-five years

old pointed out with such pride if they are of common occurrence? What dentist in this assembly who has been practicing thirty years can honestly say that fifty per cent. of all the gold fillings he has inserted during his life are now in position with no decaying leaks? In my twenty years of practice I have seen the work of Webb, the father of extension for prevention, and also the gold fillings of many other excellent operators. Every one of these men have their high percentage of successes, but they also have their failures, with gold fillings; for I have seen these failures, and in many instances replaced them with fillings that have had their percentage of failures, which will increase, no doubt, as time goes on.

When a new patient comes to me with a mouth full of gold fillings over five years old, a careful examination almost invariably proves fifty per cent. of them to have leaking edges with the discoloration of progressive decay. These fillings I invariably repair or replace, mostly replace. Before Miller made his discovery of what decay consisted of, it was considered good practice to allow a discolored gold filling to remain until it dropped out, or until at least there was palpable softening of the enamel margins. But in the light of modern science the man who will now let such a filling remain, with its ever-advancing general infection, is guilty of malpractice. And yet these fillings that I remove and replace are the work, in many instances, of prominent operators. If such men as these fail, where is the hope for the average dentist? And yet, when we examine the conditions, is such a percentage of failures remarkable?

Gold is non-adhesive, but it spreads under the hammer and theoretically approaches absolutely to every portion of the cavity surface. But practically gold has such a tendency to bridge that it is almost impossible to avoid infinitesimal air-spaces between the tooth and filling. Dr. Black recognizes these air-spaces and measures them with the air-spaces in the gold itself by specific gravity. Although perhaps infinitesimal, these air-spaces may form a chain leading up to the margin of the cavity. The margin may at first be perfect, but the slightest fracture, infection, or acid corrosion may open into a direct route for infecting the entire underlying dentin. Cement is adhesive, and by having a soft cement lining into which the gold is squeezed all of the dangerous air-spaces are avoided, and when infection does attack the cavity margin, it cannot penetrate to the dentin and the damaged edge can be repaired with the certainty that no dangerous infection has been covered up.

Indeed, when we consider the circumstances and the crude method of insertion ordinarily employed, it is only surprising that there are so many successes. In addition to dangers of infection, we have molars that may sustain a force of 200 pounds, bicuspids and incisors from 125 pounds to 50 pounds. It is a well-recognized fact that perfectly sound teeth may be fractured by a chance bite on a hard substance. This being recognized as an axiom, how could we expect that there should not be a certain number of failures from fractures when a tooth-substance has been undermined by infection, and the natural arches of resistance cut away and replaced by a non-adhesive filling, dovetailed into position with the blows of a hammer.

Theoretically, as before stated, we are supposed to make perfect adaptation of the gold with the tooth-walls. Every man in performing the simplest operation has his factor of personal error, and when we take into consideration that this hammering of gold requires a nicety of manipulation that taxes the ability of the best mechanic to its limit, we cannot doubt that with the ordinary ability of the ordinary dentist this percentage of personal error is high. When we consider the risk of powdering the enamel incident to hammering, when we recognize that an imperfect edge will let in infection that will mean the undermining of the cavity walls, when we know how few patients keep the fillings free from infection that may attack even a perfect margin—all these factors make it impossible for the best dentist on earth to be

sure that this gold filling may not fail. The engineer in making a structure makes it five times stronger than any strain in all human probability it will have to support. Having done this, if it be kept painted and guarded against corrosion, he has a right to assert that his work cannot fail. But we dentists in inserting a gold filling do exactly the opposite. Knowing that our fillings may have to stand a strain of from 200 pounds to 50 pounds, knowing that this strain if applied suddenly to a healthy tooth may fracture it, instead of putting in a filling that may stand a strain of from 1000 pounds to 250 pounds, we put in a filling that leaves the tooth weaker than it was normally. And then, in addition to this necessary neglect of structural laws, we leave these filled, weakened teeth immersed in a bacterial fluid that in a certain percentage of cases will attack the enamel margins and undermine the dentinal foundations.

Gold has too sound a record to require defense. Some teeth it has permanently saved; in others it has retarded decay for years. In some teeth through faulty manipulation and infectious environment it has been disastrous. The best friends of gold do not deny its obvious disadvantages; they try to remedy them. Gold has the best edge strength of any filling material in the world, but the difficulty of its manipulation and its non-adhesiveness to tooth-structure make a certain percentage of defective edges.

These facts alone would account for the present-day usefulness and popularity of amalgam. Amalgam can be more readily adjusted to the cavity margins than can gold. It is true that amalgam warps and bulges under continued stress, but even with this disadvantage partly overcome by the antiseptic action of oxidization, taking all the fillings put in by the profession as an average, in my opinion the amalgam fillings preserve more teeth from actual decay than does gold. Amalgam is used with fair prospects of success in cavities where gold would be but a desperate remedy.

Let me refer to a case in my own practice that I believe is typical. A patient came to me with all the crown cavities of her molars filled. Half of them were filled with gold and half were filled with amalgam. All the amalgam fillings were doing good service without a sign of marginal decay. All of the gold fillings were defective, with rapidly breaking-down edges. On inquiry the patient explained that the amalgam had been put in about ten years previous by her dentist because the teeth were too sensitive to bear the hammering, but within the last three years he had replaced some of them with gold as a more permanent filling. I replaced the defective gold fillings with adhesive gold fillings which will be described hereafter, but since the amalgam fillings had been giving good service for ten years, I allowed them to remain as they were.

I appeal to every dentist who has been practicing for fifteen years if he has not had similar experiences. I believe that the unprecedented rise in the popularity of inlays, even poor inlays, is largely due to the fact that the cement makes defective margins impossible. It is not my purpose to condemn the use of gold, but to show how a gold filling can be put in so that insidious decay, though it attack the edges, can go no farther. The methods of filling cavities with cement and gold are as old as cement itself. Sponge gold and modern science have probably rendered them more feasible. I shall not go into general cavity preparation, but shall deal with general principles.

To put in a gold filling adhesive with zinc oxyphosphate the procedure is as follows: Prepare the cavity with flat foundations and undercuts. Moss fiber gold or any good sponge gold, and No. 30 foil or any good foil, should be annealed and prepared ready for use. Soft creamy zinc oxyphosphate should then be placed in the cavity and squeezed out by mats of moss fiber gold until the entire walls of the cavity are lined with a film of zinc oxyphosphate covered by a layer of gold. The moss fiber gold should be condensed in such a way that it will not rock after the cement has begun to set. The bottom of the cavity should be filled with a sufficient mass of

gold to permit firm, hard condensation and smoothing with a finishing bur. When this has been done more gold can be added by hand or mallet to the bottom of the cavity until the filling is within about one-sixteenth of an inch of completion. Then the enamel edges are burred smooth with a finishing bur and the surface made level. The entire gold surface should now be gone over with a fine-pointed plugger to discover and condense any soft spots. These should be firmly and evenly filled, when the filling can be finished with No. 30 foil with the mallet in the ordinary way.

The method of filling with amalgam and cement has often been described. Prepare the cavity with undercuts, sterilize, and keep dry. Mix the amalgam to the consistence of thick mush. Place creamy zinc oxyphosphate in the cavity and squeeze it out as much as possible with the amalgam. Then clean the edges, dry out the remaining amalgam by compressing it in a napkin with pliers, and add the dry amalgam to the soft amalgam in the cavity until the filling is of a favorable consistence for setting. Carve to shape, send the patient away; smooth and polish on the following day.

It is not claimed that failure or recurrence of decay with this method is impossible. While we are human beings, failure with every method is possible. But it is claimed that this makes adhesive gold and amalgam fillings that ninety-nine times out of a hundred cannot be undermined by decay without giving full warning. With the gold filling, the dentin and most of the enamel is protected and supported by cement, and while the final hammering may possibly powder enamel rods on the edge, yet it is most improbable, since they are supported by the cement. But even if this slight microscopic powdering does occur and microscopic decay start, when it develops sufficiently to become apparent we can repair it with a firm assurance that this defective margin does not connect with any leak by which infection may have already started to undermine the foundations of the filling.

Of course the final pieces of gold can be burnished on the enamel edges after the Herbst method, but if gold be always kept between the hammer and the enamel, with enamel rods supported by cement on the side and dentin beneath there will be little danger that fracturing will occur.

ATOMIC RADIATION AND ITS POSSIBLE BEARING ON THE DENTAL PULP.

By R. MACDONALD, D.D.S.Univ.Pa., Brisbane, Australia.

DURING a recent visit to England I had the opportunity of listening to some lectures and demonstrations on the "electric theory of matter," and reflection thereupon has led me to think that atomic radiation has a direct bearing on operative dentistry. In order to illustrate this it will be necessary to preface my remarks with some explanation of "radio-activity" and the electric theory of matter. Some readers of the COSMOS will be perfectly conversant with it, but others may not be familiar with its principles.

The fact that a tooth will sometimes resent the insertion of a metallic filling, and yet become quiescent on the substitution of a porcelain, cement, or gutta-percha filling, together with the fact that the formation of secondary dentin takes place more readily under the latter fillings, has suggested to me the possibility which forms the subject of this article.

The researches of eminent physicists,

as well as the mathematical theories of Professors Thompson and Larmor concerning the properties of electric charges, have rendered possible a precision of ideas as regards the electric theory of matter—which theory although not universally accepted, receives at the present time the support of the majority of physicists. If you look into a "spinthariscope," an instrument designed by Sir William Crookes to illustrate radio-activity, you will witness the remarkable phenomenon of atomic radiation, and the extraordinary energy which a disintegrating atom can produce. Looking through the lens of the tube you witness the emanations of the radium striking a target of zinc sulfid, which is placed at the far end of the tube; and the bombardment—for such it is—is of the fiercest nature. This great activity is due to the disintegration of the atom.

In accordance with the electric theory of matter, the conception of an atom of any kind of matter, whether it be sodium or mercury or radium, is that it is an individualized mass or sphere of positive electricity, throughout which are disseminated a great number of minute specks of negative electricity—otherwise called electrons or "Thompson's corpuscles." All of these specks or electrons are exactly alike, and all are flying about vigorously, each electron repelling every other electron but all attracted and kept in their orbits by the mass of positive electricity in which they are situated. The measurement of these electrons, according to Lodge, is about the one-hundred-thousandth of the diameter of a material atom. In an atom of hydrogen it is estimated that there are about 800 electrons; in an atom of radium there are about 200,000.

Another principle held by physicists regarded as authorities on this new theory of matter is that different atoms—that is, atoms of different kinds of matter—are composed in the same sort of way, differing only in the number of electrons present in each atom. Thus if the atoms of a substance are such that each possesses 39.9 times as many electrons as an atom of hydrogen, that substance would be calcium; in other words, 39.9 is the atomic weight of calcium. If each atom of a substance has 199.8 times as many electrons per atom as a hydrogen atom, that substance would be mercury; in other words, 199.8 is the atomic weight of mercury.

It will be seen that according to the electric theory of matter the number of electrons in an atom of matter constitutes its character and individuality. In an atom of hydrogen, which is taken as unity, there are, as before stated, about 800 electrons, so that if the atomic weight of a substance be multiplied by 800 the resultant is approximately the number of electrons in each atom of that particular substance.

Radium is conspicuously radio-active by reason of the overcrowded condition of its atoms, which overcrowding probably causes frequent collision or encounter between the flying electrons. These electrons are traveling in orbits within the atom at a speed almost approximating to the speed of light itself—according to Sir Oliver Lodge and Professor Rutherford equivalent to about 100,000 miles a second—consequently the chance of collision or encounter between the electrons in an atom of radium is very probable. Either through collision, encounter, or excessive velocity, the atom becomes unstable, and atomic disintegration takes place.

In conformity with the electric theory of matter, in substances other than radium there is the same action going on inside each atom, but they are not so likely to become unstable, and break up, because the condition of the atom is not so crowded. Even in the atoms of a substance in which there are comparatively few electrons—in other words, in a substance of low atomic weight—the electric theory of matter would suggest that atomic disintegration does occasionally take place, but less frequently than in a crowded atom like radium, whose atomic weight is about 240.

Sir Oliver Lodge has expressed his conviction that every kind of matter may be radio-active, and this, he says, "has in the case of some metals been proved by

direct experiment." Professor Rutherford also states that "There is, indeed, experimental evidence that ordinary matter possesses the property of radio-activity to a very slight extent."

When the atom breaks up it produces three distinct rays, or emanations, which Professor Rutherford analyzed or investigated by magnetic analysis. He found that two of the emanations on being directed into a magnetic field were deflected, one to the left and the other to the right, thereby showing that they were respectively charged with positive and negative electricity. These he termed the *alpha* and *beta* rays; while the other ray, which was not deflected, he called *gamma*. The alpha emanation is composed of atomic fragments highly charged with positive electricity. The beta emanations are composed of flying electrons, and are highly charged with negative electricity, while the gamma is a very powerful form of ethereal pulsation, or X ray.

The alpha emanations are thrown out with considerable energy, and are traveling at a very high rate of speed. If stopped in their course they immediately produce great heat—indeed, so great is the heat produced by radium that a mass of it, by reason of its own intra-atomic energy, would raise its own weight of water from ordinary temperature to the boiling-point every hour. Coupled with this generation of heat there is also a constant production of electricity, while a great disturbance of the ether takes place on account of the flying electrons, and radiation or light is consequently produced. All this illustrates the energy of the disintegrating atom.

The penetrative powers of these three rays differ: The alpha ray is stopped by a layer of air a few millimeters thick or by a thin sheet of aluminum. The beta rays have much greater penetrative power, and will easily pass through wood or aluminum. The gamma rays are capable of extraordinary penetrative power, and have been detected through a solid foot of iron.

This briefly will give an idea not only of what is taking place in the conspicuously radio-active substance radium, but what—in the opinion of many authorities, including Thompson and Lodge—is taking place in all metals to a greater or less extent. The theory is that the radio-active property of a substance, or its tendency to atomic radiation, is governed by the number of electrons in its atom; consequently those substances possessing the highest atomic weights (*i.e.* the greatest number of electrons), such as radium, thorium, uranium, polonium, actinium, are conspicuously radio-active. The great number of electrons in the individual atom of each of these substances tends toward atomic disintegration; in other words, in accordance with the electric theory of matter the atomic weight of a substance represents its comparative or relative tendency to atomic radiation.

The effect of these emanations upon animal life is unquestionable. Professor Becquerel put a small quantity of radium amounting to a few milligrams in a glass tube and placed it in his waistcoat pocket. It was there only a few hours, but it produced great erythema, the skin showed signs of great irritation, and a deep and painful sore resulted which took some weeks to heal.

Another instance may be cited to show the effect of atomic radiation on cell life: A French chemist, M. Danysz, for the purpose of his experiment procured some flour which had become infested with the larvæ of a moth (*Ephestia Kuehniella*). In the ordinary course of nature these grubs exist in the grub state for a week, and then become moths, lay eggs, and die. He placed in each of two jars an exactly similar quantity of flour and similar number of grubs. One of them, the control jar, was left in its ordinary condition; the other jar was exposed to the rays of radium for a few hours. The grubs in the control flask, in a week's time, followed the usual course of nature by changing into moths, laid eggs, and died; but the grubs in the jar which had been exposed to radium were at the end of a week nearly all dead; some, however, survived for three weeks, but no change had taken place—they were still in the state of lavæ or grubs. In other

words, they had lived already as grubs three times as long as the time allotted to them by nature. Here was an unquestioned retardation in natural development due to atomic radiation.

A further illustration of the great power of these radio-active emanations is shown in the fact that if a glass containing radium be placed opposite the closed eyelids, a sensation of diffused light is immediately perceived; this is due to the emanations of the radium, which are imparted to the liquid of the eye. This can be proved by again closing the eyes and placing the tube against the temples or cranium, when the diffused light, in a somewhat less degree, will be seen. The effect of the rays is so powerful that if this experiment be persisted in, blindness will result. I have mentioned these points to prove the unquestioned effect of atomic radiation, or radio-activity, on cell life.

Now let us consider, first, the susceptibility and conductivity of the dental pulp to electric stimulus, and then pass on to a consideration of the metals which constitute the fillings, and which metals, by reason of their very high atomic weights, must all possess a relatively high tendency to atomic radiation. The superior and inferior maxillary nerves supplying the teeth are branches of the trifacial, which is purely sensory at its origin, is the most acutely sensitive nerve in the whole body, and more than any other nerve capable of responding to the very slightest stimulus. If the fibers of the small root of the trifacial nerve are stimulated by the most delicate electric current, strong convulsive movements are induced in all the muscles of mastication, thus showing the great response which the trifacial makes to electric stimulus.

Now, the degree of response and conductivity which a tooth presents to any atomic disturbance is an important one; the dentin in which the bulk of a filling is inserted is a highly organized mass, with tubules occupied by nerve filaments of the most responsive nerve in the whole system, these nerve fibers being a general connective-tissue substance much of the character of the pulp itself, and of semi-fluid composition; therefore they would offer a responsive medium to any electric disturbance such as would be produced by atomic radiation. On the outskirts of the pulp the current or atomic disturbance would meet the odontoblastic surface and would be therefrom instantly transmitted to that rich plexus of non-medullated nerve fibers or filaments immediately beneath the odontoblastic layer, and be conducted and dissipated throughout the pulp in this way. The interglobular spaces of the dentin, filled as they are with a soft plasma (plasma being a plastic liquid), would again present admirable conducting surface to any emanations from a radio-active body.

Having thus mentioned the conducting and responsive properties which the dentin and pulp offer, the relative radio-active tendencies of the metals which make up the fillings used in operative dentistry may be considered. To get a conception of the relative tendency to atomic radiation in a mass of dental amalgam, we must examine the atomic weights of its constituent parts. Take an average filling, composed of silver, gold, mercury, and tin; the atomic weights of these are as follows: Silver, 107.66; gold, 196.2; mercury, 199.8; tin, 117.5.

Comparison with other metals will show the very high atomic weight which a filling of gold or amalgam possesses. Aluminum, for instance, has an atomic weight of only 27; silicon, only 28; zinc, only 65.1. The atomic weight of radium is given at about 240, and it is in consequence of this high atomic expression—or, to express it in another way, it is in consequence of the great number of electrons to each of its atoms—that it becomes possessed of conspicuous radio-activity. Hydrogen is regarded as unity, and each atom of hydrogen possesses about 800 electrons. Radium has an atomic weight of about 240 and therefore possesses about 200,000 electrons to each of its atoms. Gold, whose atomic weight is 196.2, would possess about 156,960 electrons to each atom of its matter. Hence

the atomic weight of the elements not only indicates their specific gravity in the gaseous state compared with hydrogen, but also, according to the electric theory of matter, their relative tendency to atomic radiation. As before stated, most metals, according to Professor Rutherford, have been shown by delicate means of detection to possess radio-active properties. Taking hydrogen (1) as unity, and radium (240), we have relatively the extremes.

The electric theory of matter would assume that in gold, which possesses such a high atomic weight—*i.e.* 196.2, equivalent to about 156,960 electrons to each atom of its matter—there is an intense state of electrical activity, and the probability of excessive velocity or collision or encounter between the electrons of such an atom, Lodge says, is very great. When the collision or encounter of the electrons takes place, atomic disintegration occurs, and the rays or emanations are produced.

It would, I contend, be reasonable to assume that hyperemia of the pulp, which is brought about by inhibition of the vaso-motor nerves, may at times be produced by the irritation arising from the atomic radiation of gold or amalgam fillings. Polypus of the pulp, calcareous degeneration (such as fibrosis of the pulp, and pulp-nodules) may be influenced in their degenerative course by irritation of this radio-active nature. The calcific deposit, or formation of secondary dentin, which takes place in the pulp-chamber when the pulp is threatened, and which is an effort of the organizing cells of the pulp to protect that body from a threatening pathological condition, is a process upon which atomic radiation, or radio-activity, may possibly exert a very considerable influence. If the source of irritation in the dentin be severe, such, for instance, as that produced by a too-adjacent metallic filling, the formation of secondary dentin is improbable—indeed, resorption of secondary dentin may under these latter circumstances take place.

The deposit of new tissue formed within the pulp-cavity in continuity with the remainder of the tooth (in other words, secondary dentin) is generally seen to take place where zinc oxyphosphate, or zinc oxysulphate, or gutta-percha has been used in contradistinction to metallic fillings. The activity of the odontoblasts—or, to express it in another way, the readiness with which the pulp will entrench itself under the cover of oxyphosphate, gutta-percha, or porcelain (which possess relatively low atomic weights and consequently low tendency to atomic radiation)—is significant. On the other hand, metallic fillings placed in the same position will often produce functional disturbance of the pulp and tissue degeneration, as well as calcareous degeneration. In the latter term I have reference to the calcareous matter loose within the pulp-chamber and having no connection with the dentin. The relatively high atomic weights, and consequent relatively high tendency to atomic radiation, of the metals used in fillings where these conditions are so often produced is very significant. The frequent inability or indisposition of the pulp to entrench itself with secondary dentin under the action of metallic fillings leads one to think that apart from other reasons which may be assigned to the fact, the possible bearing of radio-activity, or atomic radiation, is one which is entitled to scientific consideration.

A nerve subjected to radio-active bombardment or atomic radiation is called upon to face currents of positive and negative electricity, atomic fragments, and flying electrons, with generation of heat, and lastly, an ethereal pulsation or X ray. It would appear, in view of the electric theory of matter, to be advisable that a protective intermediary substance should always be interposed between the dentin or pulp and the mass of metal constituting gold or amalgam fillings, and that it should possess a low atomic weight and therefore low radio-active tendency and should be capable of intercepting, to some extent, the emanations of the radio-active metals; and further, that it possess certain non-conducting properties, both as to conduction of heat and of electricity. Hill's stopping, oxyphosphate,

and oxysulphate possess these qualifications.

Sources of dental irritation are generally classed as being of traumatic, thermal, or septic origin. While I fully recognize the great bearing all these have in the production of dental pathological conditions, I think dentists with an appreciation of the electric theory of matter and the remarkable susceptibilities of the branches of the trifacial nerve, will admit the possibility of radio-active irritation.

While recognizing the hypothetical character of this paper, I respectfully submit that it is a reasonable supposition that great functional disturbance and tissue degeneration in the pulp and dentin may result as a consequence of the presence in the dentin of a relatively great mass of metal, possessing a relatively high tendency to atomic radiation.

THE CAUSE AND PREVENTION OF RECURRENT DECAY.

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(Read before the Massachusetts State Dental Society, at its annual meeting, Boston, Mass., June 9, 1905.)

THE scientific and heroic laboratory work that has the past few years been undertaken and performed by Miller, Black, Williams, and others has probably given the dental profession more absolute, scientific information on the cause of tooth-destruction in the human subject than we have received in any preceding era, and while the complexity of the conditions which surround us has prevented our complete mastery of initial caries, yet scientific research has been wonderfully instrumental in placing our work in the future upon a basis which will be a blessing to all mankind.

It is not my intention to enter into the province of those investigators; their work is before you—much of it of recent accomplishment, with probably more definite knowledge to come in the near future; but if Miller's investigations had given us no more knowledge than the fact that initial caries was caused by the action of acids, the product of fermentation, our indebtedness to him and to others who followed could hardly be overestimated, as it enables us to be largely preventive rather than corrective practitioners, and it is along these lines that the dentistry of the future must inevitably progress.

The term recurrent caries, as used in this paper, refers to that form of caries which appears again after our endeavor to correct the ravages occasioned by initial caries, by the introduction of filling material or otherwise. It is a form with which we are all familiar, and which will in all probability occupy more or less of our time and thoughts for years to come. When we seek for its cause or causes, however, we find them to be so numerous with their many ramifications, as to make a thorough and impartial investigation of the subject a task of such magnitude that to thoroughly master it might necessitate our starting from that period which marked the beginning of dentistry. I will endeavor to confine myself principally to the relation which recurrent decay bears to the different operative methods employed at the present time.

Each profession has an individuality of its own which has become more or less conspicuous through years of specialization along certain definite lines. Each member of each profession is likewise possessed of an individuality which becomes more or less marked as it is nurtured in the school of experience. They represent much diversity; the difference being temperamental as well as the result of the development of certain faculties,

or perhaps senses, which are of vital importance to one profession and of minor importance to another. It is the endeavor of each profession to develop to the utmost those faculties which have a direct bearing upon the calling to which they are related. Of the five classified senses we find that their relative value differs with each profession. Thus we should expect to find in the artist a well-developed sense of sight, especially relating to the esthetic; in the musician a highly developed sense of hearing, and so on with the other professions to a greater or less degree. Dentistry is most peculiarly situated in this respect, for certain it is that while the other professions depend upon the perfection of one or two senses, leaving certain others undeveloped as having no direct bearing upon them, there is hardly a faculty the development of which does not have an important bearing upon our calling, so complex is the intermingling of the several senses and faculties. The degree of cultivation to which the several senses are susceptible, other things being equal, must bear a relation to that which is already inherent. It must naturally follow, then, that different degrees of skill shown by many of our profession in some of its branches must be out of proportion to the difference in instruction received by them. That the abnormal development of one faculty is at the expense of some other or others is a matter of common knowledge. For instance, we do not look for high mental attainments in the abnormally strong man. Nor do we expect to find great physical strength in the world-renowned literatist or musician; when we do find them it is the rare exception. The same holds true also to a great extent in the case of the man of high mechanical or artistic attainments, and we do not look for the mechanical mind to become prominent in literature; and it is no disgrace to him that his inherent tendencies do not lie in that direction, for in our work our dependence one upon the other is quite mutual, and it is this intermingling of artistic, literary, and mechanical minds that has made our profession of today one which is entitled to respect. The diversity of our operative technique is not to be wondered at when we consider the personal equation as relates both to patient and operator.

We must therefore consider other things as well as faulty technique if we wish to arrive at broad, intelligent conclusions in relation to recurrent caries.

That the predominant inherent tendencies which we possess are sure to assert themselves in our profession is proved by the tendency toward specialization followed by many practitioners. It may be followed along the mechanical, surgical, or esthetic lines, but the production of the esthetic on a scientific basis is largely the ultimate end in either case.

Operative dentistry, without doubt, shows a greater diversity of methods employed to attain the ultimate than is shown by any other branch of the profession. The natural conclusions to be drawn from such diversity of methods is that each individual operator has mastered (in his opinion at least) the manipulation of certain materials for a certain class of cavities which give to him and his patient more satisfaction than could be obtained by a different operation, although the filling material used might be the exact opposite of that used by another equally successful operator. So marked have the different methods become that the liberty has been taken—using the selection of filling material as a basis—to divide the profession into four distinct classes.

Class I. Those whose operations consist approximately of porcelain 50 per cent., gold and plastics the remaining 50 per cent. This class must necessarily represent the great minority, owing partly to the comparatively new advent of porcelain as a filling material and partly to the many complications which accompany its successful utility. This class contains probably the largest percentage of men whose artistic and mechanical faculties, combined with a progressive spirit, have become the most pronounced. That this class will continue to multiply is not to be doubted, and its growth

is greatly to be commended when accompanied with scientific consideration, without which, however, many are sure to meet with utter failure. Porcelain filling calls for the very highest development of the operative, mechanical, and esthetic faculties combined that the profession has ever been called upon to produce, and while its use is sure to increase as we become more expert in its manipulation, the fact must not be lost sight of that like other materials it has its limitations and is yet far from being the ideal filling for the majority of operations.

Class II. Those whose operations consist approximately of oxyphosphate cement 75 per cent., other filling materials 25 per cent. This class, while also comparatively small, is steadily on the increase, and the men who represent it largely depend for patronage upon the families of wealth and refinement. Owing to the preservative qualities of oxyphosphate cement, of which the bulk of their operations consist, we find from this class of operators, other things being equal, recurrent decay exceedingly rare; in fact, except in those cases where dissolution of cement has occurred around the margins it is reduced to the minimum, and this class of operators must, on the whole, barring this latter cause, show a smaller percentage of recurrent decay than any other.

Class III. Those whose operations consist approximately of gold 75 per cent., plastics and porcelain the remaining 25 per cent. This class, while constantly diminishing in favor of classes I and II, is yet probably more numerous than either of those classes, and contains among its members many who have for years given their best energies to the public and to the advancement of the profession, men of whom we should feel justly proud and who fully merit the great rewards which we trust have been theirs. That this class will continue to diminish in numbers in favor of the preceding classes is very certain, and it is better for the community at large that it should do so, both from an esthetic as well as from a physiological standpoint, not to mention the personal benefit likewise obtained by the operator whose most exacting endeavors have been given in the fulfilment of his duty.

Class IV. Those whose operations consist approximately of amalgam 50 per cent., and gold, porcelain, and other materials the remaining 50 per cent. This class is undoubtedly the largest of all, and like other classes is subject to variation as regards locality. Representing the predominating class in one locality, it also represents the class least in evidence in another. Its numerical superiority is due principally to the fact that its patients do not as a whole represent the people of extreme wealth. That this class is second to none as regards the good it has done to mankind, and that some of the most skilful operators of today are still among its numbers, is unquestioned. Notwithstanding the fact that the subject of porcelain filling is occupying so large a portion of current dental literature (and again it is well that it should do so), we must not lose sight of the fact that the majority of dental operations performed throughout the land are neither porcelain nor gold, but amalgam. The exact ratio that amalgam fillings bear to all others inserted it is impossible to tell. Dr. Jarvie has recently said that probably they represent 75 per cent. of all fillings introduced throughout the country. This statement was substantiated by Dr. Kirk. To make a conservative estimate, it is safe to say that amalgam is used in the majority of fillings. It thus becomes our duty, no matter whether such filling material occupies an important part or no part whatever in our individual practices, to consider the introduction of that material on a scientific basis of as much importance as any operation which comes within our province. That this has never received the general consideration which its importance merits is wofully apparent. That if we are endowed with the proper professional spirit we must consider the possibility of perfecting that which may represent 75 per cent. of dental operations (even though it may have no direct bearing upon our individual practice) leaves no chance for argument.

We have classified operators, taking for a basis the filling material used, into four classes, which are more or less distinct from each other. When we attempt, however, to classify the causes which lead up to recurrent decay in the order of most common occurrence, we find it to be not only difficult but also subject to more or less elasticity, for it must be very evident that the cause of greatest frequency which might be apparent in one class of operators would be almost missing in another, so great is the diversity of operative methods.

Generally speaking, there are five fundamental steps in operative dentistry the consideration of which both individually and collectively is of vital importance to the success of the operation; in other words failure will follow in proportion as either of these steps are disregarded. These important steps may be named as follows:

(1) Thorough removal of all decalcified tooth-structure.

(2) The practice of extension for prevention with proper cavity formation.

(3) The scientific selection of filling material.

(4) The scientific manipulation of filling material; and finally,

(5) The thorough observance of oral prophylaxis.

We will consider these steps in the order given.

First: That the thorough removal of all decalcified tooth-structure should precede the insertion of the filling is one of the first laws of operative dentistry. That many operations fail owing principally to disregard of this law is well known to you all. Many operators admit without hesitation that it is their practice to let remain a certain amount of decalcified dentin when the removal of the same would involve pulp-exposure. Such practice cannot be too strongly condemned. It is safe to say that the large majority of alveolar abscesses are the result of such practice and that the charlatans are the only ones with whom it should find favor. That it is often quite impossible to distinguish decalcified dentin from the normal unless such structure be perfectly free from moisture is very apparent. That even when such precautions are carried out the diseased area often extends beyond the power of observation has been abundantly proved by scientific investigations. It must, then, follow that operating without the use of the rubber dam is largely responsible for many negative results. Inasmuch as thorough tooth-excavation is often the most trying part of the operation from a mechanical as well as a physiological standpoint, it must also follow that, with it, a sense to which we have heretofore given but little attention must become deeply involved. I refer to the sense of sight. Rapidity gained at the expense of thoroughness must also be mentioned as leading up to this cause.

Second: Failure to practice extension for prevention is one of the most frequent causes of recurrent caries common to both anterior and posterior teeth. The reasons which lead up to the non-observance of this practice are principally two. First, the belief that the operation will be easier and of shorter duration if such practice be not followed; and second, on account of prevalent sensitive dentin. The first has but little ground for its theory, for as a matter of fact operations are more apt to be shortened rather than lengthened by such extension. In regard to the second reason, I believe we are often justified in not carrying out such extension in those cases in which the physical condition of the patient must be considered.

Third: The scientific selection of the filling material has a direct bearing upon recurrent caries. That all teeth cannot be saved by the same material is a well-known fact. The improper selection may be due to inexperience in regard to a certain material, to some hobby of either operator or patient, or may be based upon that which will exact the largest fee for the least trouble.

Fourth: The scientific manipulation of filling material is of course second to none in its importance as bearing upon the subject. Manipulation other than scientific may be occasioned by defective training, desire for rapidity, gained at

the expense of thoroughness, or through physical inability—with which impaired vision must again be considered.

Fifth: Proper regard for oral prophylaxis is extremely necessary for the future welfare of the operation even when all of the other steps have been scientifically observed. Its importance cannot be overestimated, and is one to which the profession as a whole has never given proper significance.

Mention has been made earlier in this paper that to give all the causes leading up to recurrent decay would necessitate entering into the subject and beginning with that period which marked the recognition of dentistry as a profession. The writer, however, believes the conditions associated with the present era to be of sufficient importance to warrant our careful consideration, without going into ancient history, and inasmuch as some of the prominent causes given as having a bearing upon the subject are associated with that which is more or less inherent, we must at least go back to the point where the natural qualifications of the applicant are considered through entrance examinations to our various dental colleges.

The diversity of opinion among our dental educators as to the qualifications that applicants for admission to dental colleges should possess, shows that either they have never made a scientific study of the question or that they are somewhat deficient in their ability to grasp the situation. For instance, some believe a grammar-school education amply sufficient, others an M.D. degree very essential, others place emphasis on the A.B. degree, others on a two or four years' high-school course, etc.—this latter, by the way, representing the maximum education, I believe, which is required by any of our colleges for admission at the present time. That the literary standard of the applicants must be constantly raised is generally conceded, and we should be ready to go as far as lies within our power to attain this most important object, where such attainment does not conflict with other essentials which may be even more important. It is not to be supposed for a moment that the ideal will ever be attained as to qualifications necessary in any profession, much less in ours where so many faculties are involved. It remains for us to determine the most important and govern ourselves accordingly.

If dentistry be a literary pursuit to be followed irrespective of one's esthetic or mechanical inclinations, our course of action should be quite clear. If the development of other faculties than the strictly mental are of equal importance, our course of action should be none the less clear. That the importance which the physical faculties merit have never received due regard is the firm belief of the writer. What then should be the qualifications requisite? We will take it for granted that by virtue of his position the dentist should be better educated than the average man of the community. Statistics compiled from the report of the commissioner of education tells us that the number of men who pursue their studies from high school, through college or technical schools, is but one to one hundred taken throughout the country. It is thus clear that if the dental education is preceded by a four years' high-school course or its equivalent, the dental graduate has received a better education by far than the average citizen. It is a lamentable fact, however, that the vast majority of the dental colleges do not exact even this preliminary education.

The possibility that the applicant for admission to dental colleges in the future must first be a bachelor of arts or of science is perhaps too remote to warrant lengthy consideration. It might be well, however, to consider it briefly. Approximately four years must be spent in its acquisition. These four years, which are approximately from eighteen to twenty-two years of age, represent a period which is very essential to the cultivation of those senses which have a direct bearing upon our profession. Any knowledge acquired of a broadening nature must necessarily be of value to us in more ways than one as dental practitioners, and while such studies as biology and zoölogy, for instance, which may be

taken in pursuance of the A.B. degree are of considerable value to future practitioners, four years thus spent, unless it be accompanied largely by applied science, which is so essential to our calling, must not be considered. Dr. Lindstrom, in a very able paper read before this society a short time ago, truthfully said: "The A.B. degree frequently represents the study of a variety of diverse subjects which leads to no definite end." We must refrain from aping the requirements demanded by the medical profession, for the two professions are quite dissimilar. Dentistry approaches that which is an exact science. Medicine, outside of surgery and a comparatively few diseases, is quite the reverse. The four years' dental course should give ample opportunity for the acquisition of that extra-medical knowledge which is most important. Technical training, in the opinion of the writer, acquired in conjunction with the classical as given in our best scientific schools giving the S.B. degree, is far preferable to either the A.B. or M.D. degree as a preliminary education. A six years' course combining the classical and technical carefully selected, with the professional, would be an even nearer approach to the ideal.

We human beings are normally endowed with five prominent senses, those of sight, smell, touch, taste, and hearing. There are also two others not so commonly mentioned, the physical and the internal sense. As our approach to the ideal must be in proportion to the cultivation of those senses and faculties which have a direct bearing upon our calling, it is well to consider them; and inasmuch as impaired vision has been referred to as having an important bearing on recurrent caries, we will see if there are any grounds for this somewhat serious accusation.

Applicants for admission to the United States navy have to undergo examination, principally physical, to prove their fitness for the service. From the medical examiner of the recruiting station of Boston the following statistics have been obtained: Twenty per cent. of all who apply for enlistment are rejected on account of defective vision. Snelling's test is used. That is, a normal eye will read Snelling's type at twenty feet, but an eye that can read at fifteen feet will be accepted. Below this all are rejected. The majority of applicants are between seventeen and twenty-one years of age. Three per cent. of all who apply are color-blind. These statistics are not meant to be given as a proof or intimation that twenty per cent. of all applicants for admission to dental colleges are thus incapacitated, as the above tests are made without the help of eye-glasses, which no doubt, in a large percentage of cases, would bring the vision to a point practically normal, and of course allowance must be made for difference in the *personnel* of the applicants. It is well to remember, however, that applicants for enlistment do not as a rule represent a class whose defective vision is caused by over-study. Has the sense of sight, then, an important bearing upon the successful practice of our profession? Most emphatically, yes. I know of no other calling where the sense of sight should be more acute. Should not some consideration, then, be given to it in connection with applicants for admission to dental colleges?

Let us consider another important sense, that of touch. Its importance to us varies greatly with the operation. In certain operations its high cultivation is not an essential; in others its highest development is not only important, but *vital* as well. Let us take, for example, the treatment of pyorrhea alveolaris and kindred afflictions generally accompanied with minute, deep-seated deposits which cannot be seen, and removal of which must precede the cure. The sense of touch in such treatment is as important as the sense of sight to the porcelain worker. The sense of sight and other senses in this treatment are secondary to the sense of touch, which is absolutely essential in its higher form, and when such sense is not inherent or possibly acquired, success in the treatment of such cases is impossible. It is also more than probable that the difference in results obtained has a certain relation to the degree

in which this sense is possessed. We have a standard set for the normal sense of sight. There must also be a normal sense of touch, which, however, as yet is not so well defined.

Mention has been made of the success obtained by that class of operators, as regards recurrent caries, whose filling consists largely of oxyphosphate cement; recurrent decay with its use, except where dissolution has occurred, being practically unknown. Too much emphasis cannot be placed upon this fact, as this material has virtues which place it in a class by itself. That it has not more generally been made use of in combination with the vast majority of metallic fillings is greatly to be regretted. That its use is frequently resorted to as a base for abnormally large metallic fillings, we, of course, well know, but these fillings must necessarily represent the great minority. Its antiseptic, non-conductive, and compatible qualities are of such value to tooth-structure that it should be used as a lining or base for *all* metallic fillings, excepting those cases where the use of it will not allow of sufficient body of metallic filling being added to insure durability of the operation. Judgment must be also exercised with its use, for its bulk and consistence will vary from that which is scarcely more than a veneer in shallow cavities to that which constitutes the bulk of the filling in those which are deep-seated, and its function will vary from being a preserver, non-conductor, and strengthener of tooth-structure to that which offers the principal or only means of retention for the subsequent filling.

Practically, such procedure applies to the great majority of posterior operations, and necessarily of course to a smaller percentage of anterior operations, those in which full advantage must often be taken of all tooth-structure to insure proper retention. In other words, where metallic fillings are employed our object should always be the maximum of cement and the minimum of metal which may be used commensurate with the strength of the operation. If this practice be faithfully carried out, recurrent decay—followed altogether too often by alveolar abcess, especially where amalgam is used as a filling material—will be reduced to the minimum, the cement not only acting as a non-conductor but as a barrier to the decay made possible by the shrinkage of such material. It would seem that the scientific consideration given to the manufacture and insertion of amalgam is in inverse ratio to the percentage of operations it represents. While certain definite rules must be followed in the manipulation of gold or porcelain, lest the operation become a failure even before completed, failures equally as bad when amalgam is used may not come to light for weeks or months after the operation. Owing to the fact that ordinarily it is somewhat more unstable than gold, students should be taught the necessity of using the extra precautions which the material demands in all steps of the operation.

Applied science down to its minutest detail as relates to operative dentistry must be carefully observed if success is to follow. It should be preceded by that knowledge obtained from standard works relating to the different branches and carried into effect at all stages under the guidance of none but instructors of much experience. Such able scientific works for instance as Black's "Dental Anatomy," Johnson's "Principles and Practice of Filling Teeth," and Kirk's "Operative Dentistry" should be to the dental student what Gray's "Anatomy" is to the medical, and possession of them should be obligatory, together with thorough study of them, upon every dental student in the land.

State board examiners by virtue of their position are able both directly and indirectly to influence the future standing of the profession to an extent which is not generally appreciated. In my association with students of two different dental colleges as a student, I was impressed with one thing above all others which they had in common; which was, to be able to insert a gold filling that would pass the state board—the attention given to oral prophylaxis and other important operations being always of secondary importance. State board exam-

iners deserve much credit which they never receive for their exacting and conscientious labors, but they, too, must base their examinations on the lines of progression, for by so doing they give an impetus to the student to perfect certain important operations which he would otherwise tend to neglect.

The last subject which I offer for your consideration—the basis of professional fees—is one which has an indirect bearing upon the title of the paper and one which to my mind is of vast importance and in the future must be given more consideration than it has received in the past if we ever hope to put our profession on the basis which it certainly merits. This subject is generally alluded to with apologies for so doing. Some consider it too delicate to allude to, or perhaps give it no thought at all. The writer offers no apologies, for the subject is of too vital importance not to receive its proper consideration. Dentistry is a unique profession in more ways than one. Ascending from obscurity where once it was not given the recognition due to an ordinary trade, it steadily advanced along positive, scientific lines, overcoming tremendous obstacles, and finally reaching that point where it was dignified by the name of profession, the members of which were bound by a written as well as an unwritten code of ethics to follow professional instincts. It must be admitted that this abrupt transformation is almost without a parallel, and therefore it is not to be wondered at that many trade instincts still cling to many of its members. That some of them should be handed down to the present generation, however, was more than we really desired or expected, and if the basis of professional fees was intended to be handed down to us unchanged as a reminder of our one-time obscurity it certainly has not failed of its purpose.

What are the distinguishing features which tend to separate different callings into the trade, the profession, the mercantile, and so on? Simple definitions of the one or the other fail utterly to give the true distinction, so complex are the higher senses interwoven with the professional calling. That which gives the professional man a different standing in the community than is common to other callings is not necessarily because of the superior intellect with which he may be endowed; it is well if he has it, but it is a secondary consideration. His position is due to the fact that he deals most prominently with the higher senses of the animate as opposed to the inanimate, and as these several senses are largely responsible for our existence and well-being, they constitute the closest ties which can be related to the human being.

Treatment of the different senses varies in the different professions. One may deal largely with the spiritual sense, another with the physical or internal sense, and so on, but in all these cases it is the higher senses which are directly involved. It must not be lost sight of, then, that inasmuch as a certain compensation is necessary for our existence, even though we do live in an exalted atmosphere, such compensation should be based upon grounds which take into consideration the personal equation as relates to the several senses of different individuals. The physician, realizing that of two patients having the same kind of disease one may require thrice the amount of his time that the other will demand to effect the same end, finds it wholly impractical to base his fee on so much per disease, the personal equation of the patients making such arrangement out of the question. His fee is based largely upon time consumed, as any profession should be which deals directly with the higher senses.

So it is with teachers of music, who, realizing the inherent mental and physical inequalities with which they have to deal, find it impracticable to make a definite charge for the acquirement of a certain technical step which may take three times as long in one case as in another.

What is the prevailing basis of fees in the dental profession of today? Fully seventy-five per cent. of its members base their fees on a trade basis, the other twenty-five per cent. having at last found such practice to be incompatible with professional ethics. We should, indeed, think

it strange for the physician to have a standard fee for the treatment of rheumatism, another fee for pneumonia, and still another for malaria. The public at large would rightfully look with suspicion upon such a practitioner, and yet their grounds for such a basis are as strong as ours for having a standard fee for a certain kind of operation, which practice largely prevails. It may be well to mention at this time that while the only physicians who charge so much per disease (and there are a number) are classified as medical charlatans, the dental charlatans use the same basis as is followed by fully seventy-five per cent. of reputable dental practitioners, and inasmuch as certain dental authorities in the state of Massachusetts have recently issued circulars to dentists for information in regard to the best means for protecting the unsuspecting public from such practitioners, it is well to remind them that until dental fees are placed on a professional basis there can be little or no protection. Suffice it to say that the charlatan who now performs five operations in the time which would rightfully belong to but one, will find it an altogether different proposition to put five hours into one when fees are based upon time consumed. The public has for generations been given to understand that fees must be based upon the kind and amount of filling material used. Such belief has made it comparatively easy to obtain three times the fee for a gold operation as for any other which may take even more of our time and skill, so thorough has been our false education of the public to the intrinsic value of filling material. Such education of our *clientèle* reflects but little credit upon us as a profession, and has been largely responsible for the great number of unsightly looking gold crowns which we frequently see, and such a customer is largely taken advantage of by charlatans. Practitioners who base their fees on the intrinsic value of material used, to be consistent, must demand a no larger fee for a porcelain than for a plastic operation. Dental educators have it largely in their power to correct this evil as well as others, and it is upon them that we must primarily rely.

It is as important for the welfare of the public as well as the profession that as much importance be given to dental ethics as to any other branch of dental knowledge. That it has never received that attention which its importance merits is only too apparent. While great significance is often attached to the education which should precede the dental education, graduates are turned loose to fight the battle of life with no definite understanding whatever of what constitutes the proper basis of this most important consideration. Such education cannot begin too soon, and must be put into practice by the student toward the latter part of his course, if only for a month, a week, or a day—until its importance is firmly established. This practice should also be supplemented by instruction to those who apply for treatment at the dental infirmary, informing them that outside of such infirmaries all fees should be based upon time consumed. Unfortunately we must admit that the basis of fees has a certain relation to many negative results, and will continue to have until such basis will allow of the scientific selection and manipulation of filling material, together with the proper physical and mental treatment of the patient.

In conclusion, I wish to express my firm belief that dentistry in the future is sure to progress as it has done in the past, but that its progress will largely depend upon the application which we may make to it of the scientific and esthetic, combined with the practice of those higher qualities of true manhood, carrying with it all which the name implies.

PROCEEDINGS OF SOCIETIES.

CONNECTICUT STATE DENTAL ASSOCIATION.

Annual Convention, New Haven, Conn., April 18 and 19, 1905.

TUESDAY—*Morning Session.*

THE forty-first annual convention of the Connecticut State Dental Association convened in the Y. M. C. A. Building, New Haven, Conn., April 18 and 19, 1905.

The first session was called to order on Tuesday, April 18, at 10 A.M. by the president, Dr. D. W. Johnston of New Haven.

The first order of business was the reading of the minutes of the last meeting, which was on motion dispensed with, the minutes having appeared in printed form.

Dr. EBERLE, chairman of the Committee on Necrology, reported as follows:

Mr. President and Members of the Connecticut State Dental Association:

Your Committee on Necrology respectfully reports and recommends the adoption of the following resolutions on the death of Drs. Chas. P. Graham and J. J. Lavin:

DR. CHAS. P. GRAHAM.

Whereas, Since our last meeting one of our honored and esteemed members, Dr. Charles Parmele Graham, was, on November 1, 1904, called from his earthly labors and will meet with us no more, we give this expression of our feelings in the loss we have sustained.

Dr. Graham was born in Utica, N. Y., coming to Middletown, Conn., in early life; he studied dentistry under Dr. Luther Parmele, and later acquired a large practice himself.

Dr. Graham was prominent in military circles, advancing from private in 1871 to brigadier-general in 1885, and in 1895 was appointed adjutant-general by Governor Coffin.

He was a member of the first Board of Dental Commissioners, and later was elected president of the board.

Dr. Graham was one of the original members of the Connecticut State Dental Association, joining as a charter member in 1864, and was president in 1895.

As an active church worker at Middletown, Dr. Graham's many years' residence there gained for him much respect and esteem.

Therefore be it

RESOLVED, That we testify to the loss we experience in the death of Dr. Graham, and that we extend our sincere sympathy to his family; and further, That these resolutions be spread on the records of this association and that a copy be sent to Mrs. Graham.

DR. JAMES J. LAVIN.

Whereas, We mourn the untimely death of our fellow-member and friend, Dr. James J. Lavin, who on March 17, 1905, joined the great association of those who have gone on before.

He came to Hartford from Middletown, Conn., in 1893, and studied dentistry under Drs. George F. Barrett and Charles K. Bryant. Dr. Lavin made many friends, and in 1901 started in practice for himself. In 1899 he was elected a member of this association. Though of a retiring disposition, he was respected and admired by those who knew him best.

Therefore be it

RESOLVED, That we express our heartfelt sympathy to his wife, and that these resolutions be entered on our records and a copy be sent to Mrs. Lavin.

The report was on motion accepted.

Dr. E. S. ROSENBLUTH. I have received two communications from Dr. Williams Donnally of Washington, relative to an army and navy bill which is now in charge of the committee on dental legislation of the National Dental Association. Dr. Donnally has been making a determined fight before Congress toward uniform rank for those dentists who shall be in the service of the

navy department, and he has asked that the Connecticut State Dental Association give its indorsement to the efforts to obtain for these dentists a rank equal to that of the medical men; that is, the rank of commissioned officers instead of that of contract surgeons. I think it is no more than our duty that we do so, and I therefore move that this association give its hearty indorsement to the efforts of the committee on dental legislation of the National Dental Association.

Dr. JAMES MCMANUS. In seconding that motion I will say that a resolution was passed by this society a year ago, which I do not think expressed its real sentiment. When I say its real sentiment, I mean that it did not express the real sentiment of the individual members of the association. I do believe, however, that a large majority of the dentists of the country are heartily in favor of sustaining any action of the committee of the National Dental Association, which has for a number of years been working for the benefit of the soldiers and sailors of the country. They have asked—and reasonably asked, I think—for the appointment of dental surgeons to commissioned rank, the same as that of the medical practitioners in the army. I believe, as I said before, that a large majority of the dentists of the country are in entire sympathy with the efforts of the committee of the National Association, and I want this association to express itself strongly that we sustain the action of that committee. I therefore second the motion of Dr. Rosenbluth.

The motion was carried.

The CHAIRMAN. If there is no further business before us. I will call on Dr. J. Tenney Barker, Wallingford, recorder of the State Dental Examiners, for the report of the dental commissioners.

Dr. BARKER. I do not think it necessary for me to make any report at this time, as the annual report of the commissioners, I think, covers the entire ground. All I can do at this time is to give a few figures that may possibly interest you. At the present time there are legally entitled to practice dentistry in the state of Connecticut six hundred and thirty-six dentists. Fifty-five of this number are dead; eighty-two have removed from the state, eight have retired, and sixty-two cannot be accounted for—making a total of four hundred and twenty-nine practicing in the state and registered. During the year the commissioners have examined one hundred and fifty candidates, ninety-two of whom passed and fifty-eight failed.

Motion was carried to adjourn until 2 P.M.

TUESDAY—*Afternoon Session.*

The second session was called to order at 2 o'clock by the president, Dr. D. W. Johnston.

The first order of business for the afternoon was the reading of a paper by Dr. L. ASHLEY FAUGHT, Philadelphia, Pa., on "Therapeutics in Everyday Practice," as follows:

THERAPEUTICS IN EVERYDAY PRACTICE.

Some years ago, when I was a student of medicine, the professor of surgery had a phrase in which he seemed to take peculiar delight, and in which he not infrequently expressed himself to the class in the moment of affording surgical relief to some poor suffering patient. "Gentlemen," he would say, "behold the blessing of the antiphlogistic touch of a therapeutic knife." In it he felt the embodiment of surgical therapeutics, and it has always remained fixed in my mind that as surgeons— at least, if you please, as dental surgeons—there are other therapeutics than that which is ordinarily thought of as the usual meaning of the word. To say *therapeutics* is to universally signify the employment of drugs, although the dictionary definition of the word is "that branch of medical science which treats of the application of *remedies* to the cure or alleviation of disease"; and while I shall in this short address incidentally tell you of the drugs I use, I shall, in the broader latitude of meaning thus afforded me, speak of the remedies which as a dentist I daily apply in combating that rampant disease, dental caries.

Your essayist comes not to you puffed up with the idea that he will present new or original teaching. He sees before him men of years, full of ripe experience; but as one who has laboriously toiled with you, it is his desire to present a plain unvarnished tale which shall open a thought in the mind of the young practitioner—and to which, in the discussion, you may add such additional suggestions as may to this class prove of great assistance. It is, then, to the young practitioner of dentistry that I especially address myself.

If there be one thing more than another in daily practice which has impressed itself upon me, it is the insidiousness of dental caries. We talk about it in an offhand way, and we flatter ourselves that we are familiar with this fact; but, day in and day out, I am convinced as I stand by the chair and examine the mouths of patients presenting, that the average dentist has not reached the point at which he translates his belief into doing. New patients present themselves too frequently in whom an exhaustive inquiry discovers too many points of existing dental caries to longer allow the belief that they have received in the past the most careful dental treatment.

I am well aware that there are many reasons to be given to explain this condition—unwillingness of the patient to submit to treatment, inability to properly remunerate for services, etc.; but, inasmuch as in the cases coming under my observation all is in time accomplished and proper fees rendered, I can but believe, as I have stated, that the fault is usually with the dentist.

And so, at the risk of criticism for this plain speech, I wish to advocate the view that dental therapeutics commences with that appreciation of the insidiousness of dental caries which shall cause each one of us to approach a mouth presenting for our care with the determination that the initial steps shall be a thorough cleaning, scaling, and polishing of the teeth, and a careful examination by positive illumination, by the use of wedge and explorer, to the finding of every point of disease and the laying bare to the patient the exact condition—fearlessly, boldly, and honestly expressing both to the patient and to ourselves the existing state of affairs, and under no conditions allowing the patient to think all is well with the mouth until we know that all is well. Let what is done be done thoroughly; and if time, or money, or any other thing, will not permit us to give the mouth complete treatment, let the patient go away knowing the treatment is incomplete; let him depart with the full knowledge of his need. Impress upon patients that an incomplete treatment of the mouth is a very undesirable condition, for decay untreated is a menace to the rest of the mouth; and urge upon them the great desirability of receiving temporary treatment, at least, to serve until more thorough attention can be obtained.

You see, gentlemen, I wish to do away with that alluring habit which I fear is growing upon too many practitioners of dentistry, that of treating large cavities of decay—the more observable or prominent ones—and the nursing along of a mouth by allowing the patient to think all is well until some future return, by which time the omitted minor cavities have grown in size and are thrusting themselves into notice. This nursing may have the seeming advantage of not sowing dismay in patients, or of taxing their pockets too heavily at any one time; but it is unjust to them, and exceedingly unjust to the profession. I trust I have made it clear that therapeutics in everyday practice includes *primarily* the means so well known to us all by which the teeth may be placed, at least temporarily, in the clean, healthy, and serviceable condition in which nature intended them to be, and that the attainment of this condition is the first duty a dentist owes to his patient and to his profession. Not until the public dreads and is ashamed of unclean mouths will the star of dentistry rise to the zenith of its true dignity; and this will not be until dentists universally shall begin each new relationship by such an application of these therapeutics as shall teach the public what it ought to know and to believe.

I now wish to direct attention to the finishing bur as a therapeutic remedy; and in speaking of the effects to be gained by its free use I wish to include its auxiliaries—approximal trimmers, files, disks, and finishing tapes. I am sure, after a moment's reflection, you will agree with me that while it is our pleasure at times to have a mouth present for treatment in which the former work is a perfect dream of beauty and usefulness, such a condition is seen only at times. More often, indeed the usual experience, is for our critical eye to see fillings in a more or less unfinished state—fillings with rough, unpolished surfaces, with overhanging, protruding, or jagged edges, faulty contour, etc., the result either of being left in that state or the effect of time, use, or wear. Your essayist refers to these things now for the purpose of inculcating that it is good therapeutics, and demanded for thorough treatment, to devote the time and labor necessary to restore proper conditions to these fillings; to bring them up to a state of perfection, and to make them serviceable in the highest degree to resist decay. And right here, in giving this service, comes a call for the full appreciation of the beauty, shape, and usefulness of a natural tooth—made as nature intended to make it. I believe we are all contourists now, but I am not aware that attention has been directed with special emphasis to the great necessity of contouring the occlusal surfaces of the teeth so as to keep their normal shape and design. Flat fillings in the sulci, and flattened conditions elsewhere on the occlusal surfaces, are too much in evidence for the attainment of the true function for which nature has thrown the bicuspids and molars into convolutions. I believe it is our duty to most carefully restore the shapes of occlusal surfaces, as well as to maintain contour in the approximal and other surface relationships.

Having now delivered myself of these things under the wider latitude of the technical meaning of the word therapeutics, I wish to speak more in accordance with its usual meaning, and talk of one or two drugs which have been of daily use to me.

I have found that trichloracetic acid, in ten per cent. solution, has great merit in reducing inflamed marginal edges of gums to a condition of health, particularly where the gum is broken out from the interspaces of molars and bicuspids. I apply it by means of a pointed orangewood stick carefully inserted between the gum and the teeth. Two or three applications made at intervals of a day or so will work wonders.

Another favorite drug of mine is silver nitrate. This I use in a forty per cent. solution—with great care, of course, as this solution is caustic in its effects, and needs to be applied with great directness, every precaution being taken to confine it to the exact territory indicated for treatment. One or two applications will cure hypersensitivity at the necks of molars, both to touch and to thermal changes. I believe that its use will limit the tendency to decay, and for this purpose it has great merit when we are caring for the third molars. These teeth are of value, and, as you all know, on account of their situation in the mouth, are exposed to peculiar attack. The cleaning process at the hands of the patient too often fails to extend far enough back to reach them, and continual neglect compasses their destruction. They are difficult teeth to fill, and with the loss of their pulps are practically impossible teeth to satisfactorily treat, their total loss soon following. My discovery of the application of forty per cent. silver nitrate to dental purposes has been a boon to many of my *clientèle.* In this strength it is absolutely germicidal, and with it I feel able to cope with many situations in which formerly I was absolutely powerless. It is a great comfort-giver.

In the matter of drugs for root-dressing, I quite agree with Dr. D. D. Smith when he says, "If it be proper to speak of specifics among remedies, creasote—pure wood creasote—is a specific as a root-dressing." I have always found it so in the cases in which I have used it, and in thirty years' practice they have not been few. The honors, however, where staining has not to be considered, are with me about equally divided be-

tween it and a preparation made from oil of cinnamon, which I believe to be cinnamic acid. Securing true oil of cinnamon, I keep it in a bottle from which the cork is permanently removed, the orifice and neck of the bottle being kept loosely stuffed with fibers of cotton to prevent the ingress of dust or foreign matter, yet so as to permit a free circulation of air. In time, the oil of cinnamon undergoes a change, darkening in color—an oxidation—and the liquid then has properties peculiar to itself, vastly different from oil of cinnamon; it is less irritating, far more healing, preservative, perhaps germicidal. As a root-dressing, either alone or in combination with aristol, I like it and therefore use it.

So much for the definitely practical side of this paper. Now, before closing, I wish to indulge in a little theory. An idea has come to me lately which seems to contain a kernel of truth and a promise for the future. I have not had time to experiment enough with it to say anything positively regarding it; still I wish to mention it, that others may help in its development. If there be one condition of the teeth more than another which is today attracting the attention and concern of our patients, it is erosion. Too frequently, beautiful teeth, the pride of their possessors for some years, at a definite period of life begin, in spite of excellent personal care, to show the fatal marks of erosion, and appeal is made for treatment. Our therapeutics institutes the usual local and systemic treatments; but we know, and in time the patient finds out, that we have by no means compassed the disease. Erosion continues, recession of gums continues, and failure stares us in the face. These two diseases, or symptoms of diseases if you please, are masters of the situation—an overpowering local condition. True it is, I believe, that our therapeutics would not be without benefit if the patients would be as much in earnest as we dentists are, but after a short spasm treatment is neglected. Indeed, the patients are deeply grieved at the disease and its progress; but they wish the cure to come at once, as by the waving of a fairy wand.

An allied condition to this erosion and recession of gums, at least in its distressing effects, is that in which caries becomes rampant in spite of our best efforts. We know that there are mouths in which, owing to the peculiar morbid condition of the secretions, recurrent decay sets in again and again, and the teeth fairly melt.

To meet these three diseases here outlined—erosion, recession of the gums, and proneness to dental caries—I think our therapeutics should develop remedies which when systemically administered would alter the nature of the deleterious secretions in their very production. To change acid secretions to alkaline, to change alkaline secretions to acid after they are poured into the mouth, is not exactly the way to do the trick. Local mouth-washes have proved more or less impotent. It remains yet for the dental profession to do better than this—to develop, by experiment, drugs which when systemically administered will, during the time of their exhibition at least, absolutely control the nature of the secretions of the mouth, producing the character desired. I am at work in this direction, and hope to make to the profession a report at some future date.

Discussion.

Dr. C. W. Strang, Bridgeport. The very excellent paper that has just been read emphasizes thoroughness in every department of our work. The essayist made so many good points that I cannot hope to touch on all, even for a moment, but I will dwell on one or two, leaving the rest for the others who may take the floor after me.

This matter of thoroughness—thoroughness as to examination, thoroughness in the cleansing of teeth—means a great deal. It means that there must be fixed in the heart of every operator the golden rule, "Do unto others as you would that they should do unto you." It is not easy, I admit, for the busy operator to carry out this idea at all times, under all circumstances, and in all departments of his work. For instance,

there come to the office persons who desire examinations. You may be busy, and you express yourself along this line—that you cannot give them a thorough examination because you have not the time. They say "Oh, it will only take a moment." Now, a moment's examination is a worthless, delusive, and a dangerous thing, and I do not want to take upon myself the responsibility of saying to a patient that his teeth are in fairly good condition, that so much needs to be done, and so-and-so is the trouble in the case. Every operator should take time to go to the bottom of things, so that he can hold up his hand and say, You have so many cavities that need filling, and such a treatment is required. We do not want to take risks with our teeth. When a patient goes to an operator for professional service he wants to know what should be done. And so it is according to my way of thinking by far the best way to decline to take the responsibility upon our shoulders, unless the patient is willing to make a special appointment, when we may have time to make a thorough examination; and if patients do that it will largely eliminate the very unpleasant duty of destroying exposed pulps and treating pulpless teeth.

Now, in regard to the matter of thorough cleanliness: I notice that the essayist has emphasized that point particularly. I grant you that it is more fascinating to make gold operations, and indeed to do almost any kind of filling, than it is to be thorough in the cleansing of teeth—to spend hours of time upon a mouth in order that we may bring about a state of absolute cleanliness. Many years ago there was created in my heart such a horror of pyorrhea alveolaris, and my teachings as a student were such that I tried from the beginning to the very best of my ability, with the instruments at hand, to keep the deposits from the teeth of my patients; and I want to say that nothing has been of greater satisfaction to me than my efforts made years ago right along that line. While perhaps the majority of us have endeavored to be thorough in finishing approximal fillings, not to allow any margin of the filling to protrude beyond the cavity margins, not to leave along the cervical wall protruding or rough edges, I will venture to say that many of us have had the experience, upon examining some of these fillings one, two, or three years afterward, to find that in our operations along the cervical walls a surplus of filling material had not been trimmed off. Perhaps some have not had that experience, but I have had it, not altogether with gutta-percha fillings on the approximal surfaces—for you know gutta-percha has an erratic way of protruding outside the cavity; I refer to gold fillings that we have endeavored conscientiously to trim until we supposed we had it down to the cavity margin.

Now, in regard to the application of medicaments, it was said of old Dr. Riggs that he depended entirely upon surgical means, and he had no confidence in the application of medicaments in the treatment of pyorrhea alveolaris. I have a recollection that Dr. Riggs used to say that in his treatment of pyorrhea he did not want any dog-water about it; I don't know what he meant exactly. For many years I practiced along that line, and felt that what could not be accomplished by the removal of calculus from the teeth, and consequently all sources of gum irritation, would not be specially benefited by the application of medicines. I have, however, changed my mind, and I believe the application of medicaments to these pyorrhea pockets will be attended by gratifying results. I have had no experience with trichloracetic acid, but I use aromatic sulfuric acid largely in my practice. I have heard others speak in very high terms of trichloracetic acid, but I prefer to use the aromatic sulfuric acid.

Dr. J. E. Heyke, New Haven. As I did not have an opportunity to read the paper before it was presented, I cannot go into a detailed discussion of it. One question, however, always presents itself to my mind whenever a certain one out of a group of agents of similar action is singled out as being particularly beneficent. Some men, for instance, speak of

the great efficacy of sulfuric acid; others again can't imagine how any man with just a little sense left can use anything but lactic acid; still others, and among them the essayist, are wonderfully impressed by the unparalleled transposition of pathologic conditions accomplished by the antiphlogistic touch of trichloracetic acid applied with a stick of orange-wood. How much wiser we would grow if all the men who read papers before dental associations would stand up and give some reason for using a certain medicine, or tell how it differs in its action from other agents of a similar nature!—for instance, in this case, how a burn from sulfuric acid differs from those of lactic and trichloracetic acids. That would be adding something to our knowledge instead of raising a gyrating windstorm.

Dr. S. Freeman, New York. This paper is ideal, but in presenting it Dr. Faught has overlooked the main point, and surrounds his treatment with so much mystery that it behooves me to request him to state what method he is employing at the present time to produce those systemic conditions which will alleviate or retard that disease, erosion, as I am positive that we all would prefer to work on lines on which we could offer our patients some relief.

Dr. Joseph Head, Philadelphia. The point I wish to speak of is Dr. Faught's systemic treatment. We know that the ordinary erosion is at least partly caused by either acid sodium phosphate or acid calcium phosphate. We also know that the piling up in the blood of carbon dioxid, owing to a lack of perfect oxygenation, tends to cause the excretion of these acid salts. We also know, according to Miller, that the bacteria increase more rapidly in alkaline than in acid solution, and as Miller has also pointed out, that in an acid mouth the acid will cause tooth-decay, and in an alkaline mouth the bacteria will grow more rapidly, finally generating an excess of acid that will attack the teeth. So, in speaking of this question of how to combat erosion by systemic drugs, Dr. Faught would do well to show us how to avoid the horns of this dilemma. If medicines are given which will cause the saliva to change from alkaline to acid, the tone of the system may be so lowered as to cause oxygenation to be retarded, and harmful acidity increased. Or if a saliva is changed to acid from alkaline, there may be an extra flow of acid calcium phosphate. The administration of drugs is an extremely complicated problem, for when we give drugs for a specific cause we stir up a great many factors in the system of which most of us know little. For instance, some of us can take quinin to cure a cold, because quinin does not stir up certain centers, and acts almost as a sedative in these cases; but in others quinin acts as a profound excitant. So when we are trying to give these drugs to counteract the erosion we should bear in mind that we are working in a field where there is risk of doing harm as well as good.

Dr. R. Ottolengui, New York. I agree with Dr. Freeman that it would be interesting to us to know a little more of the special line of experimentation in which Dr. Faught is engaged. Without knowing that, however, I venture to prophesy that if he is looking for a tabloid to prevent or cure erosion he will not find it.

Dr. Faught made a statement in his paper which is true only to a certain extent. In speaking of teeth which are sensitive at the necks, and in cases of recession of the gums, Dr. Faught spoke of silver nitrate, and alluded to it as rather a curative agent, both in inhibiting caries and in acting to alleviate the distress of sensitive teeth at the neck, especially in the presence of recession of the gums. Now, I have seen this advocacy of silver nitrate very frequently, but have you ever stopped to think why it acts at all? I am not chemist enough to be certain of my ground, but I think these teeth are sensitive because they are superficially destroyed by the acids of the mouth. You will notice that this sensitiveness rarely if ever occurs on dentin which has been denuded of enamel, but mainly at the neck of a tooth or at a portion beyond the neck

which has never been protected except by cementum. I take it that this perhaps has become softened by acid action. Now, what does silver nitrate do? I may say if you apply the rubber dam and then give the parts a treatment, you get better results, which is evidence of the correctness of my theory, which is that you simply protect the parts by coating them with silver nitrate. I believe it is nothing but a mechanical protection—the coating of the denuded parts.

Dr. Head. It has an antiseptic effect at the same time.

Dr. Ottolengui. I admit that, but what I want to get at is the treatment through the system. Dr. Head has very prettily pointed out that you are confronted with two horns of a dilemma. If you make an acid condition you have one difficulty; if you make an alkaline condition you have another. What is the normal condition of the mouth? It seems to be one of neutrality. If that be true, it should be the physician's aim to restore the normal function of the entire body. I am going to relate an instance in practice that is significant in this respect. I had a patient who suffered from this intense sensitiveness around the necks of the teeth. I went through the whole list of treatments, but the patient obtained no comfort. The use of alkalines locally would give a little temporary relief, but if the patient forgot to use the medicine the pain would return again. This was not a disease condition, it was just simply recession of the gum from advancing age. Now the history of the case was that this man had at one time been a liquor-drinker. In time he changed from the ordinary whiskey to a diet of different liquors. Finding that one interfered with his digestive functions, he tried other liquors. Finally he had a serious spell of sickness, and was close to death, and after some consideration on his part he decided that he had been making a mistake in drinking anything at all. Not from a moral standpoint, but because the use of stimulants was destroying the functions of his organs. He thereafter abstained absolutely, and this peculiar result has come about that he has an increased flow of saliva, he has a better condition of blood, and he is in fact in better health than he ever was. As this change has occurred the sensitiveness around the necks of his teeth has disappeared, and a test of his oral fluids shows that they are now neutral.

In reference to Dr. Strang's remark about "dog-water," I will say that it is nothing more or less than zinc chlorid. The expression of dog-water was applied to it by plumbers to designate the bottle and its contents.

Dr. M. L. Rhein, New York. I think we have rarely listened to a paper deserving of a fuller discussion or of more meritorious character than that which we have just listened to. As I have been asked to say a word or two on this subject I desire especially to emphasize what Dr. Strang said upon this question, namely, that if we are going to treat a patient, that we ought to do so absolutely as we individually would like to be treated were we in the patient's place. That has been the keystone of every dentist's success, and the failure to follow that divine law in practice has brought about all the detracting elements of criticism which dentistry has received, either in this country or in any other. I want to add my hearty indorsement in regard to what the essayist said about the preliminary placing of the mouth in an absolutely clean condition, and to maintain a state of cleanliness, if the patient expects his dental organs to remain in a proper condition.

Now a word in regard to the question that has been under discussion—the question of erosion, the one that has been such a bugbear to us in years gone by, and one which has been wonderfully illuminated in the last few years, especially by the work of Dr. Kirk of Philadelphia. And I may add for the benefit of those who are interested, that in the April number of the *Dental Review* there is the most exhaustive article on this subject that has yet been published, being a *résumé* of everything done in the past, and following out the line of work that has been so well done by Dr.

Kirk, Dr. Hinkins, and others. Here is brought out the true principle involved in this subject, and this consists in restoring (but it cannot always be done) the true physiological condition of the patient. It is impossible for erosion to exist under such conditions. If the proper physiological condition of the system can be restored, that will put an end to any progress of erosion. All the investigations up to date have absolutely proved that to be a fact. It depends entirely upon the ability of the dentist or the physician who has charge of the patient to accomplish this result, and both the previous speakers have wisely said that it is not a question of changing the oral fluids from an acid to an alkaline condition, but it is a question of stopping what has brought about this abnormal condition of the system, because this is simply an expression of an existing abnormality. This abnormality often arises from the vital organs, the lungs, liver, heart, and kidneys, and certain forms of auto-intoxication. Where the average physician fails to find anything wrong with the patient, and we see this condition of erosion existing, the cause can generally be found in auto-intoxication, especially in people of sedentary occupations.

Now, a final word in regard to the local treatment. I have had remarkable success in the treatment locally of erosion; I mean the stopping of the inroads of erosion, the stopping of erosion itself, even where I realized that I have not been able to effect a constitutional cure. The reason that these abnormal conditions produce acid mucus is because around the gums is found the point of least resistance. The capillary system at this point anastomoses to so great and fine a degree that anything in the circulation that is detrimental is most liable to find here a seat for its systemic expression. If we can shift that symptom to some other part of the body we relegate the patient to some other class of practitioners—which is the point I want to bring out; and that can be done by improving the tone of the circulation of the gums. I do not care how you do it, but if we can keep the mouth absolutely clean, keeping the circulation of the gums in a healthy condition, we shall not have any local expression of abnormality. I have tested this over and over, and by means of massage of the gums in various ways, performed more or less frequently, according to the demands of the case. But you may ask how I know I get these results. Erosion is progressive or not, and by the existing symptoms a diagnosis is reached. If the sensitive condition in apparently normal teeth ceases, it is safe to assume that erosion is not progressing, and if by massage we get a cessation of these symptoms, it is safe to conclude that the local expression is being arrested.

Dr. G. A. Maxfield, Holyoke, Mass. I was very much interested in the paper, and also somewhat disappointed. I want to refer to the portion of the paper dealing with therapeutics in daily practice. The writer said he wanted to specially emphasize this for the younger members of the profession. Now, I want to say a few words just for their benefit. Coming in contact with so many in the last ten years, I have been disappointed to find in them a lack of knowledge of therapeutics which every dentist should possess. In all of my questions on therapeutics probably not one-fourth of the candidates that come before the Massachusetts Board would pass if the questions on materia medica and therapeutics were the ones they were to be passed on. The essayist speaks of creasote being an excellent thing in daily practice. I agree with him, and do not think he can emphasize that too strongly. Yet what do I find in answer to questions on creasote? The applicant is asked to describe creasote, and to give its therapeutic values, and for answer to that I am told that it is seldom used today. I ask what creasote is, and its uses in dental practice, and that is the answer I get. Now that comes from college graduates; and where do they get it? One student told me that his professor told him that it was a vile-smelling thing and should not be in any dental office. The professor who says that utters an untruth, and

says what he ought not in teaching students. I ask the question, Is carbolic acid soluble in water? and ninety out of every hundred will say that it is freely soluble in water. I was talking last evening with a gentleman, and in speaking of sterilizing instruments, he said he kept a solution of forty per cent. carbolic acid on his bracket, and constantly dipped his instruments into it. Now, what I want to know is how to make a forty per cent. solution of carbolic acid. You cannot make a forty per cent. aqueous solution.

In regard to the treatment of root-canals, speaking of aristol for this purpose, I have gone back to the vile-smelling iodoform; and I did it because I get better results.

Dr. Ottolengui. How do you use iodoform?

Dr. Maxfield. In solution with oil of eucalyptus. I know it is unpleasant to use, but the results justify it. When I go home at night my wife will say, "You have been using that vile-smelling iodoform again."

In regard to trichloracetic acid, I have had excellent results with it in the treatment of pyorrhea.

Dr. Gaylord. What strength?

Dr. Maxfield. I have used all strengths. I usually, however, employ a saturated solution. There are some mouths more sensitive to it than are others, and in these cases I apply a little sodium bicarbonate solution, and that will immediately stop the burning sensation. Then again, in treating cases of pyorrhea, the last thing I do in the treatment is to use the compressed-air spray with a weak solution of carbolic acid. It relieves the soreness of the gums and produces a slight anesthetic effect, and the patient says, "How nice that feels."

In regard to long operations for fillings, etc., we must take into account the physical condition of the patient. Some patients can very easily stand the time it takes to make a beautiful gold filling, while others cannot, and in some of these latter cases the patient will not recover for a long time. We must consider that we are liable to cause a great deal of trouble from long operative procedures. The nervous strain on the heart, and also on the dental pulp, is to be considered. We very often have after-troubles with a dental pulp because of our rash treatment of the tooth.

Dr. O. T. Rule, Meriden, Conn. If college graduates give such answers as Dr. Maxfield says to questions in therapeutics, and if these men go to the right place to get their information, it is not a question of where they got their knowledge, but of where they forgot it.

In regard to therapeutics in daily practice, the essayist has certainly given us a broad definition of therapeutics—one which includes any means by which disease is stopped.

With regard to thoroughness, I think thoroughness is in a degree a relative term. I do not consider that thoroughness implies that we should always cut out every little speck where it is possible to catch the point of an explorer. For instance, if two patients, one of forty and the other of fifteen years, have several places in the occlusal surfaces where the explorer will catch, it may be necessary to at once excavate such places in the case of the younger person, but entirely unnecessary in the case of the older one. This is due to the vast difference in density in different teeth. In approximal cavities that are very small I often advise a patient to wait three or six months, that such cavities may then be cut to the occlusal surface with less pain. I believe that the best way to fill approximal cavities is to extend them to the occlusal surfaces, but to do so in the case of very small cavities would cause considerable pain by reason of cutting through the intervening dentin.

The essayist has spoken of leaving occlusal fillings with flat surfaces. The shape of the surface of an occlusal filling, whether flat or concave, I do not consider to be of the utmost importance as a therapeutic agent. We often find teeth that are worn down flat or very slightly concave, without cusps or sulci, and almost entirely free from caries. I have a pair of models of such a case which is the finest specimen of occlusion that has

come to my notice. Why similar surfaces the result of the dentist's labors should not be as good as those produced by natural causes, I cannot see.

Dr. OTTOLENGUI. I was very glad to hear Dr. Maxfield admit that he used iodoform. It *is* a vile-smelling thing, and many object to its use, but iodoform is very valuable sometimes, and I get excellent results with it in cases which seem to resist every other mode of treatment. In this connection it may be interesting to you to know how I use the iodoform. I have it in a tightly corked bottle, put in a box, sealed, and put in the farthest corner of the office. When I want to use it I tell my assistant to bring me the bottle. Just before using it I put some ether in the bottle and stir it. I then prepare the dressing, and carry it to the tooth as quickly as possible; the bottle is then returned to the corner and the instrument used is thrown out of the window. I do not have any odor of iodoform around the place, and, gentlemen, I want to say that I have used this medicament in that way in apparently unmanageable cases, and I have never had any future trouble.

Dr. F. L. FOSSUME, New York. I believe in the use of the rubber dam in washing the necks of sensitive teeth. In connection with the sodium bicarbonate, I use a forty per cent. solution of formaldehyd gas. I have not seen a case which has not been—I won't say permanently cured, because I do not know—but I have not yet seen a case that has not been relieved. This has been one of the greatest helps that I have ever had in overcoming these cases of erosion. The rubber dam must be used in treating the teeth in this way, because if it is not, the formalin will destroy the vital gingival margins and cause great pain. Great care should be taken in using it. It is not necessary to keep the preparation on the teeth very long; a couple of minutes will be sufficient.

Dr. MAXFIELD. Just one word in regard to why Dr. Ottolengui gets such good results from the use of the iodoform as he described. It is simply because of the penetrating powers of the ether in which he dissolves the iodoform. If he will use chloroform instead of ether, he will get still better results.

Dr. FREEMAN. In reference to the use of iodoform, I may state that I have used the same in my practice since 1883. The *modus operandi* is as follows: Make a saturated solution of iodoform in chloroform; take a drop-tube or syringe—I prefer the S. S. White platinum point drop-tube; place a few drops of the solution in the root-canal, then with a gutta-percha point pump this into the root-canal, thereby making an antiseptic gutta-percha solution in the root; follow the first gutta-percha point with another until the root-canal is entirely filled. I had occasion to open a few root-canals which were filled some time ago in this manner, and found a decided odor of iodoform. I read a paper in 1888 before the First District Dental Society of New York on the use of hydronaphthol and chloroform used in this manner.

Dr. FAUGHT (closing the discussion). Whenever I read a paper I have in mind the strong desire to endeavor to provoke discussion. I suppose an essayist should feel grateful if he is fairly torn into shreds, and feel that he has accomplished the purpose for which he read his paper—that is, to bring out differences and not similarity of views. I am nevertheless gratified at the discussion the paper has received and I am still further personally grateful to you for the very kindly attitude toward it. I recognize that in dealing with such a subject and presenting it in the way I have that I am treading on dangerous ground, particularly in closing the paper with a theory of what I felt was something and yet felt that I did not know what was in it. In studying these conditions I recognize fully that these three conditions, erosion, recession, and the rampant condition of decay in the oral cavity, are not diseases but are oral manifestations of disease. I recognize therefore that in systemic treatment we necessarily must go farther, perhaps, in order to be of benefit to our patients than to change merely the conditions

locally. We attempt in the mouth more or less to control the local conditions by means of local applications, therefore I do not see why we should not attempt to control in some measure the actual production of the glands. Now, whether the saliva should be acid or alkaline, or whether it should be neutral, is leading us into an exceedingly difficult course. From the experimentation that I have already made I cannot resist the feeling to go into it—recognizing the specific, so to speak, in medical practice. We think of malaria and we think of quinin; we think of syphilis and we think of mercury. We know that certain drugs are eliminated through certain organs, and we give drugs to act upon the different glands of the body to produce the conditions we desire. Why then should we not be able to extend that influence to the saliva? It is only a question of experimentation to find out how to attain it.

Going back to the other theme of the paper, that of thoroughness: One gentleman said he did not feel the need of cutting out every little rough place. I know, of course, that we have certain conditions which we know we can control where this is not absolutely necessary, but I believe that in any compromise with thoroughness we may find that we have waited too long. Very frequently in these little places that we can hardly detect, if we excavate with a bur it will be found that it drops into a larger cavity, which demonstrates to us how foolish it would be to compromise with thoroughness. One point I wish to emphasize relates to the use of new and sharp instruments on these young teeth. Have the instruments in such a condition that they will do the work quickly and thoroughly; under these circumstances there is no difficulty in preparing a cavity and finishing the filling.

When we see the unfinished edges in fillings we must not always blame our fellow practitioner, because we do not understand the conditions; he is not always to be censured. I believe, however, that we must bring these fillings up to the true shape which nature intended they should have. There are many cases in which an operator may insert a filling where owing to pressure of time, and owing to the lack of time on the patient's part, or some imperative engagement, he may not have sufficient time to properly finish the filling. He does not intend to leave the work in this condition, and he cautions the patient to return and have the filling finished, but time goes on and the patient overlooks the necessity of his returning to the dentist, and so we have operations in an unfinished condition that were never meant to be left that way.

On motion the subject was passed.

The next order of business was a paper by Dr. C. N. Johnson of Chicago, on "Differences in the Preparation of Cavities for Fillings and for Inlays," which in the absence of Dr. Johnson was read by Dr. R. Ottolengui.

[This paper was printed in the Cosmos for August 1905, at page 922.]

Discussion.

Dr. M. L. Rhein, New York. The subject of Dr. Johnson's paper is unquestionably one of those timely ones that is particularly appropriate since porcelain inlays have come into such general use during the past few years. After listening to Dr. Johnson's paper I surmise, especially since I have examined the specimens, that he is comparing the preparation of inlays with gold fillings. He speaks of gold fillings in certain portions of the paper, but he does not say that he is comparing the two specifically at the outset. In his absence I do not think it is safe to conclude that he has reference to any other form of filling, inasmuch as there would be a wide latitude in the discussion if we considered all the different forms of fillings, because the preparation of a cavity for an amalgam filling and that for a gold filling have essential differences to be considered. Therefore I judge that he is simply comparing the differences between porcelain inlays and gold fillings.

It is very difficult, after listening to the short though accurate differentiation

that he has made, to have any valid differences with the author. From the manner in which he has presented the paper and in which he has prepared the specimens, it is unquestionably necessary for the dentist of today to carefully differentiate as to how to care for the different cavities, whether to insert gold fillings or porcelain inlays, for the reasons that he has so tersely presented to us. It is incumbent upon us for the successful insertion of an inlay that we depart from some of the methods that we have learned are so essential to the success of the gold filling. While I am not in absolute accord with the essayist on some of the essential details of his preparation of the gold filling and the porcelain inlay, in the main I thoroughly coincide with him.

I differ a little with him in that he seems to leave us too uncertain as to the thickness of the bulk we are capable of leaving in a gold filling to insure sufficient strength on the grinding marginal surfaces. Now, it is an important factor in the insertion of a gold filling in these places that the operator should accurately judge before inserting the filling and before preparing the cavity as to how much stress and strain that particular tooth is going to have on the grinding surface. In a large number of cases where there is a great amount of masticatory force brought into play, a thin surface of gold will prove but a temporary result where a permanent one has been expected. Some people who use great force in masticating will wear away the gold surface with great rapidity, and I especially desire to call attention to this particular point, that in such cases where gold has been decided upon it is necessary to cut away sufficient of the grinding surface of the tooth so that there will be sufficient bulk of gold to stand a given amount of stress. This I consider one of the most important points brought out in the paper.

While I agree with the essayist that a great many failures are due to the attempt to put in too thin inlays and rely upon the adhesive quality of the cement, still there is a difference in the strain that certain forms of porcelain will endure. We fail to find the strength in the high-fusing porcelain for this purpose that we get from the homogeneous quality of Dr. Jenkins' body. It is one of the strong points in favor of the Jenkins body as an inlay, that in the same amount of surface, where used on the grinding surface, it will stand the strain infinitely better than the high-fusing. This is due entirely to the fact that it is a homogeneous mass when it is thoroughly fluxed.

Exception must be taken to the view that we cannot have undercuts in porcelain inlays. As a general principle his premises are correct, but like every other principle laid down there are vital exceptions to it, and they come into play in those cases where we must have undercuts for placing our fillings so that our patients will not bring them back to us in their hands. It is possible to use undercuts in the preparation of cavities for porcelain inlays, and yet have the matrix in such a form that it can be removed without impairment of the perfection of that matrix. It can be done by finely shaping the cavity, as Dr. Ottolengui has beautifully shown. A perfect undercut can be made in a cavity like those of the bicuspids that have been passed around; the undercut can be brought up at a right angle from the floor of the cavity to the occlusal edge, and the matrix removed from the occlusal opening, the cavity being flared sufficiently to produce the necessary V shape.

The secret of success in the insertion of inlays is in a great many instances due to the fact that one side of the inlay is so flatly shaped that when the inlay is cemented into position it will be in its proper place. In certain classes of cavities, especially labial cavities, it is important that the inlay should be so shaped that the exact position in which it is to be placed in the cavity is readily distinguishable by the operator, and the cavity should be so prepared that the operator knows that his inlay is going into the place for which it was intended.

Now this may seem to many of you an unnecessary remark, but all practitioners who have had much experience with the round bur-shaped inlays in labial cavities will realize how difficult it is at times to know just which part of that inlay fits the corresponding part of the cavity. At the corners of teeth I have seen men insert an especially beautiful inlay, one that fitted perfectly, and after it was cemented into place it was nothing but an eyesore, because the operator had not taken the precaution or did not realize that it was necessary to obtain the absolutely accurate adaptation of the inlay to the tooth when it was being cemented into place.

Gold fillings and porcelain inlays each have their place, and porcelain inlays will never, so far as we can see at the present day, take the place that the gold filling properly fills. It is a wise thing for the older men to throw out a little caution to the younger practitioners not to be led away by the wild enthusiasm of the extremist in porcelain, and not to be in a hurry to relegate their gold pluggers to the junk heap. As far as we have at present developed we cannot get along without gold fillings in some places. I am a great believer in porcelain from the esthetic standpoint, where the filling is going to show, and I would rather replace a porcelain filling, if necessary, than to have a gold filling obtruding itself upon the sight of the public, but the experimental stage of porcelain in the distal portions of the mouth is altogether of too recent a date for us to dare assert that it ranks with gold as a permanent operation. I recognize the fact that this is a little foreign to the subject, but I think it pertinent to be introduced into the discussion at this time.

Dr. Joseph Head, Philadelphia. It is true, as Dr. Johnson says, that his gold filling would have to be so shaped or constructed that the tooth would break before it would come out. The same thing applies to porcelain fillings; either the porcelain or the cement has to break, and the thing for us to do is to make these porcelain inlays so that the porcelain will break first; get enough body to the cement to hold the inlay. This can best be done by making undercuts.

Among my experiments*—I will not trouble you by giving the figures—I came across a very interesting fact, namely, that old cement when carefully cut and dried would give an adhesion with new cement much stronger than the cement would make with the porcelain inlay or the etched inlay. The adhesion was simply tremendous. With that factor in our minds, what is the difficulty —when we consider the statement of Dr. Johnson that in order to properly prepare a cavity for a porcelain filling we are obliged to sacrifice much tooth-structure, so as to have every cavity shaped for easy removal of the matrix —what is the difficulty in filling the cavity first with cement, then cutting it out and making a perfectly simple cavity with clean enamel margins? That being done, we can make a simple matrix on perfectly clear enamel margins, make the inlay, undercut well and also with deep grooves in the old cement. I cannot see any more sacrifice of tooth-structure in this way than in originally shaping the cavity so that the matrix can be easily removed. There seems to be an impression that it is necessary to shape the cavity the way it is going to be when finished—that we have to form the cavity exactly on the lines we want the inlay to occupy. Why not prepare them so as to get this adhesion of the old cement? Make them so that the cement will act as dowels; use plenty of cement body to your inlay. Dr. Johnson's statements concerning the necessity for vital differences in the ultimate shapes of the cavities for an inlay and for a gold filling does not seem to be borne out by my experience.

Dr. Rhein. I want to make a little correction, or rather an addition, to my previous remarks lest they may be misinterpreted. What I said as to the advantage of making undercuts on bicuspids in the manner I described referred

* See Cosmos for July 1905, p. 779.

to undercuts which we could utilize in the contour of the inlay itself. I want to add that before inserting the inlay the final preparation should of necessity include a most thorough undercutting of the cavity for the retention of the filling by the bulk of cement, and this, I am almost positive, has been unintentionally omitted on the part of the essayist—in that he refers in the preparation of the cavity simply to the form of the cavity to make the necessary form of matrix, and not as to the shape he intends to have when the inlay is inserted into position. I also want to say that I see no necessity for making this undercut preparation before the matrix is made, but I see great advantage in delaying it until after we have a perfectly fitting inlay to place in position. We can then remove all of the interior of the tooth that we want, so as to obtain sufficient bulk of cement to retain the inlay properly.

Dr. C. S. HARDY, Summit, N. J. I quite approve of the remarks Dr. Head made in regard to the adhesiveness of the new and the old cement, and also Dr. Ottolengui's method of getting an undercut which Dr. Rhein has mentioned. That is something I always do when possible in putting a filling in the approximal surfaces of the bicuspids and molars. In regard to the preparation of the cavity before taking the impression, there is one point that I would like to bring out which I think no one has mentioned, viz, in an approximal filling I find that a great many impressions are taken without smoothing off the surfaces of the tooth, and little portions of the edge of the filling are found to project over the edge of the cavity. These break off when an attempt is made to cement the filling in place, leaving an imperfect margin to the filling. By taking a disk and making the surface of the tooth smooth, a much better and truer edge for the filling is secured.

Dr. C. C. PATTEN, Boston, Mass. My work is along the same line as that of Dr. Head, although there is easily a chance for argument between Dr. Head and myself. Inlay work as I have looked upon it is to a great extent very similar to inlay work as done by woodworkers. One of the principles in applying inlay work to woodworking is to get a good joint and then exclude as much of the cementing medium as possible. It has been my practice to have as little bulk of cement between the porcelain and the tooth-structure as possible, by securing well-adapted porcelain and then by pressure holding it in place until the proper time for the cement to set. In many cases it is desirable to fill the cavity with cement and then reshape the cavity before securing the matrix; after that a certain amount can be removed. The formation of the cavity has to be governed by the conditions that confront the operator, and whatever principles are adopted it is sometimes necessary to depart from them. All these ideas brought out in discussions of this kind will aid us in our work.

While I started out very enthusiastic over porcelain, and while I still have a large amount of that enthusiasm, I am inclined as the years go by to be more conservative in the application of porcelain for fillings. Some cases where I felt reasonably justified in expecting good results were somewhat disappointing, not because the principles involved were wrong, but because of misplaced judgment on my part. Properly used, there is no combination of filling materials that will so well stop the ravages of decay and restore the harmonious appearance of the tooth-structure as will a combination of cement and porcelain well worked.

Dr. S. C. G. WATKINS, Monclair, N. J. That idea of undercutting in the approximal grinding surfaces of bicuspids in order to slip the porcelain filling in as a dowel is a magnificent idea. I have practiced the undercutting as described by Dr. Head, but the other idea is a new one to me, and I was very glad indeed to hear it.

Dr. J. H. HANNING, Brooklyn. At nearly every meeting we hear references made to the woodworking of the carpenter compared to the inlay work of dentistry. There is no similarity between

glue and zinc oxyphosphate, nor is there any similarity between enamel and dentin, or oak and hickory. No matter how thin a film of glue, still a good adhesion between two pieces of wood can be obtained because of the cementing medium penetrating the substances to be held together. Now, if we were to set inlays with glue and had the inlay and tooth-structure as dry afterward as the wood is, and could have the cementing medium penetrate the tissues, we would have as good a joint as in the case of the wood, but a thin film of cement, under conditions we have to meet in the mouth, will give little or no strength. I think one of the vital points in inlay work is to get sufficient bulk of cement in the cavity to hold the inlay, and I think the essayist is correct in this statement.

I believe, as many here believe, that the cavity should be shaped in such a way that if possible a dovetail shape is secured, and one from which the matrix may be easily removed, and when the inlay is placed in position it should be dovetailed against the line of stress.

Dr. Ottolengui (closing the discussion). Ordinarily, while to read a man's paper is easy enough, yet to close the discussion of any paper would be an entirely different matter; but to close the discussion on this paper is quite easy. I am sure that the gentlemen who have differed with Dr. Johnson would not have an inch of ground to stand on if he were here, and I do not think they will have more than an inch and a half as it is. Now, in the first place I really feel sorry for Drs. Head and Rhein because each has discussed a paper and differed with the author without first having read the paper. I am sure that when they read the paper they will wish that they had not differed with him.

I know that in closing this discussion I am likely to be looked upon as appearing in a dual capacity—first to defend, and then to take exceptions to some things in the paper. In other words, the moral is, Never read a paper of another man and discuss it too. However, there is no point in the paper which admits of any discussion whatever. The thing is an absolute finality. Why? Because Dr. Johnson knew he was not going to be here and he was very careful not to say anything that was not absolutely correct. He has only laid down the A B C of this work and given you the fundamental differences between the preparation of a cavity for gold and the preparation of a cavity for porcelain, and these differences must be made. Whether or not before he puts the inlay into the cavity he changes the shape of the cavity is another question, but what Dr. Johnson stated was, that it was necessary to follow one form of preparation for gold and another for porcelain.

Dr. Rhein spoke about undercuts, and he pointed out that I had originated a formation of cavity with undercuts, and that Dr. Johnson now says that we must not have undercuts. He did not mean no undercuts, but he meant undercuts of that character which so hold the inlay in that it cannot be removed. He gave in his examples two styles of undercutting for the retention of gold, and he departed from that in the retention of porcelain fillings, and in both cases you see what he means. In one you have a labial cavity in which there is a slight flaring at the axial wall, and in the other an undercut completely around the circumferences. Now, when we come to the bicuspid, he pointed out in a beautiful manner that where there is an approximal cavity in bicuspids for gold which comes up to the outer occlusal surface, and in which there is an initial wedge-shape approximal cavity, the larger edge of the wedge should be pointed toward the gingival border, being narrow reversely, and the widening of the side inwardly. Then he points out the lines, reverse to this, for inlay preparation.

Dr. Rhein. I want to ask Dr. Ottolengui if it was not an error of omission on the part of the author that he left the cavities without allusion to the final condition prior to the insertion of the inlay. I believe it was an error of omission, but if not it really should be corrected. I realized after listening to the paper that it was rather hurriedly written, and it is

very easy under those conditions to omit a point of this nature.

Dr. Ottolengui. He does not change the shape of the cavity, but when the inlay is finished it is inserted into the tooth. Dr. Head's experiments proved conclusively that the original recommendation of Dr. Jenkins, that the nearer an inlay was made and inserted in the shape of a collar button, the more securely it would be fixed in position. I never knew what undercuts meant until I saw Dr. Jenkins make one, and in presenting this in a paper I conceived the thought of conveying the idea of the undercut by saying that it was shaped like a collar button. Dr. Head's experiments have proved that that is the best way to hold them in. In these cases you see, though, that the undercut is in the inlay, and not in the cavity.

Dr. Head. I do not agree with you in that. In all of my experiments the cement left the ivory and stuck to the porcelain.

Dr. Ottolengui. When your porcelain was not undercut?

Dr. Head. Yes.

Dr. Ottolengui. In your first experiments, when the inlays were unetched, when the inlays were forced out, was the cement on the inlay or in the bottom of the cavity?

Dr. Head. There was not much appreciable difference. There was some on each, but whenever the inlays were etched there was a much stronger adhesion.

May I ask one more question? Do you, speaking for Dr. Johnson, in the light of what has been brought out, think that the preparation of a cavity for a porcelain inlay requires more destruction of the tooth-structure than does the preparation for gold? I am speaking of enlarging the opening.

Dr. Ottolengui. Dr. Johnson said that no one could be a successful porcelain operator who would be afraid to cut away tooth-structure. Now, as a matter of fact, we will let Dr. Rhein prepare a cavity for gold, cut it as much as it is necessary, but not having in mind porcelain, and when he has finished this preparation have the patient tell him he had decided to have porcelain there, and he will then have to cut it some more —that is all that Dr. Johnson means.

Dr. Rhein. Except in the change of of the preparation of the margins I do not agree with you. I do not agree with your interpretation that this applies to cavities prepared with the wedge-shape effect.

Dr. Ottolengui. I want to say, gentlemen, that there is no question about this difference. There is this objection that I make to the special preparations for cavities, that they are to a certain extent ideal. They are started in sound teeth, and in that way we can work to a certain formation. I have seen beautiful specimens of cavity preparation from the West, with these beautiful little square steps in them; I have also seen many teeth so decayed that you could not put a step in them to save your life, and these teeth are the ones in which we have to cut away more structure to put in porcelain. The only way to prepare these cavities for porcelain is to do one of two things—cut away the tooth-substance, or reduce the size of the cavity with zinc oxyphosphate, as Dr. Head suggested. I still believe, however, that the less oxyphosphate we have in a tooth the better, because the crushing strength of oxyphosphate is not as great as the crushing strength of porcelain, and so I believe, in those teeth where we are simply compelled to put in a bulk of oxyphosphate, we must prepare the cavity so that the porcelain will rest on ledges in the tooth, and not on the oxyphosphate, so that the pressure will be on the porcelain and not on the oxyphosphate.

Dr. Johnson knows, and I may add that I also know, that there are many cases where the shape of the cavity must be changed after the preparation of the matrix. Now, whenever this has to be done, it is because for one reason or another the cavity cannot be shaped at the outset as one would desire.

Dr. Rhein said that Dr. Johnson's cavity preparation shows very square sides, and then Dr. Rhein said we should always have a flat side. If by the flat

side Dr. Rhein means the side labio-lingually, I stand ready to agree with him, but if he means that it should be the side which is at right angles to the axial wall I do not agree with him. I would a great deal rather in all corner preparations have a definite angle in that side. I would prepare it flat first, and then put a groove in afterward.

Dr. Rhein. I have reference to that flatness of the side by which, when you place the inlay in the cavity, you are sure that it is in the right place.

Dr. P. B. McCullough, Philadelphia. Dr. Rhein has overlooked the importance of making undercuts in the tooth. I would like to know whether it is his rule always to make undercuts in the teeth, and also in the porcelain inlay.

Dr. Rhein. That depends entirely on the cavity. I have no absolute rule, but I always put undercuts in the cavity before the filling is permanently inserted. My form of preparation of the cavity is also dependent upon circumstances and conditions. I always etch all porcelain inlays, and in addition to that I give the porcelain an undercut in the manner outlined by Dr. Ottolengui.

Dr. McCullough. In a simple cavity on an incisor where the filling is to stand little stress, do you undercut that?

Dr. Rhein. I always undercut the cavity. I prepare my cavities in line with the cavity preparation of Dr. Johnson, and before inserting the inlay, in order to increase the resistance against masticating force and the possibility of displacement, I undercut the cavity as thoroughly as I would for gold.

Dr. McCullough. You say you make a deep undercut in the labial face of a central incisor in order to increase the resistance against displacement. Suppose the labial side is thin and very frail; that is, where you are inserting a corner filling.

Dr. Rhein. The corner of an incisor, if properly prepared, is much more secure, frequently, than what appears to be a simple labial filling. They are the most satisfactory fillings with which I have to do.

Dr. McCullough. What about a case where the mechanical action does not involve that part of the tooth under stress?

Dr. Rhein. There is always some stress. There is stress of mastication, and there is stress of the opposing teeth striking against each other. In preparing these corners they should be ground so that the stress of mastication will not interfere with the corner, and the cavity preparation should be such that the stress of the lower incisors striking against the upper incisor cannot be sufficient to displace the inlay.

Dr. McCullough. The point I wanted to bring out had reference to cases in the labial incisors where there is very little stress and we have a very small bulk of porcelain in the cavity. When we try to cut a groove around that, we find that the amount of porcelain is so very small that we cannot make a groove in it.

Dr. Rhein. I would not undercut an inlay of that kind, I would simply etch it.

Dr. McCullough. I have been attending dental society meetings for fifteen years, and I never saw the discussion of a serious question take such a humorous turn as has this. According to Dr. Ottolengui, we have in the presentation by Dr. Johnson of the A B C of porcelain work an exposition of the highest point of perfection that it is in the power of the human mind to conceive. Dr. Ottolengui states that what he has presented here is simply beyond fallibility, and we have found for the first time perfection in a man from Chicago.

Dr. Ottolengui. I want to say that when I said Dr. Johnson, not being here to defend himself, only wanted to present what was absolutely correct, the A B C of this work, the fundamental principles of porcelain work, I meant it not humorously but seriously. There is very little in the paper indeed, and nothing to warrant extravagant language such as the gentleman has just used. What the essayist has said is irrefutable, as much so as the statement that we must clean our teeth. Dr. Johnson has simply enumerated a few principles, and I re-

peat that these principles are indisputable.

There being no further business before the society, the subject was passed and motion was made and carried to adjourn until the evening session.

TUESDAY—*Evening Session.*

The evening session was called to order at 8 o'clock by the president, Dr. D. W. Johnston.

The first order of business for the evening session was the reading of a paper by Dr. M. L. RHEIN of New York, on "The Technique of Pulp-Removal and Root-Treatment Associated Therewith."

[This paper was published in the October issue of the COSMOS, at page 1196.]

Discussion.

Dr. R. OTTOLENGUI, New York. I think it will be my principal pleasure in discussing this paper to simply give the weight of my evidence in favor of what Dr. Rhein claims for it. He has very kindly kept me familiar with his technique in this class of work for almost the number of years he has mentioned; in fact, I may say that a tooth in my own mouth, which had for years been in the condition last described, after years of treatment was at last made comfortable by the treatment which he has described. I will go over just one or two points in the paper in the order in which they were touched upon by the essayist.

Beginning with cocain anesthesia for the extirpation of pulps, the essayist has warned us against the danger of forcing cocain beyond the apex of the root. There I naturally agree with him. I can also see how the danger is lessened if the application be shortened, but I cannot quite see how the essayist has been able to get success in the limited time in which he claims to have done it, that is in from twenty to twenty-five seconds. I have operated practically as described in the paper, and I must confess that I have found pulps which I have eventually removed painlessly, but which I have examined after one minute of pressure anesthesia to find them absolutely painful, and in some cases it has taken actual time by the watch of from sixteen to eighteen minutes to anesthetize some pulps. This has not been simply a matter of taking eighteen minutes and then making an effort to remove the pulp, but attempts have been made every few minutes, until at last the pulp has succumbed and has been removed. I made the statement that they have afterward been successfully removed, because there are cases in which one cannot succeed. In the case of pulps which are the seat of nodules the cocain seems to act very slowly, if at all.

Now, gentlemen, when we come to speaking of preventing the passage of cocain through the end of the root, I say I admit the advantage of a short application as having a tendency to lessen the danger; at the same time we are just what the essayist has said—we are empirical. We do not know, or at least I do not know, whether the cocain passes into the pulp, as one might say osmotically, or whether it enters the blood tracts and follows the capillaries. It is my belief that it follows the capillaries; then, again, I have seen, in experiments, cases where I was tempted to believe it passed down along the odontoblastic layer between the pulp and the root-canal. I wish to say that I have submitted certain specimens to a biologist, and he tells me that things I thought I saw I did not see. I mention this merely because I touched upon this subject before this society last year, and I wish to show that the matter has not yet been solved. Until we know exactly how cocain passes into the pulp, it will be difficult to determine how to prevent it from passing through the end. I think you can readily see that if it be taken into the capillary system, it is most reasonable to believe that it passes immediately beyond the end of the root, because certainly the capillaries are continuous with the system beyond and through the end of the foramen.

When I spoke on this subject last year at New Haven, I touched on one

unpleasant feature in my experience of this work which the essayist has not touched at all, which seems to indicate that he has had a different experience. It has been my unfortunate experience, in the removal of living pulps by pressure anesthesia, that some operations have been followed by copious hemorrhage. We have been told nothing by the essayist about the management of this hemorrhage, and I would be glad if he would give us a little of the technique in that direction. Without waiting to hear it, however, I wish to say since the difficulties with hemorrhage at my hands I have abandoned the use of adrenalin chlorid, and have had no further trouble. And yet that is the recommended means of producing exactly what it seems to me it does not produce. It occurs to me that by using solutions treated with borine this can be avoided. I use it for the following reason: In a very instructive paper given before one of the Philadelphia societies, the author in speaking on this subject spoke of the advantage of adding to the mixture some of the essential oils, and making a solution with alcohol, and he said a simple means of preparing such a mixture is to mix the cocain with some of the antiseptics on the market known to contain these oils; and borine being the antiseptic I use, I make the mixture with that, and have had happy results with it. But sterilized water is also safe, and to my mind a better means than making solutions with adrenalin chlorid. I think that when you use adrenalin there is more danger of prolonged hemorrhage from the apical region than by using any of the solutions mentioned.

I cannot too strongly indorse the proposition of the essayist to open the tooth widely. If you were digging for gold, you would make a large enough hole to see the gold, but I have seen roots treated through little apertures through which, while it may be possible to pass an instrument into the canal opening, it was impossible to see the canal opening. I think we should be able to see the opening in order to be thorough in our instrumentation.

I also cannot too highly recommend the simple means of sterilizing the canals—as Dr. Rhein brought forward so beautifully—with the use of kalium-natrium, otherwise called Schreier's paste. I will touch upon that in a little different direction from the essayist, because I would like a great many more people to have the success that we have had. Again and again people have told me that they could not use this material because they could not control it. This medicament comes in a sort of test tube, and must be protected from air to prevent disintegration or oxidation, and is therefore covered with paraffin. As Dr. Rhein said, make a little puncture through the paraffin and remove as much as will come out on an instrument. Now, to preserve that medicament we must, as soon as we have finished, seal the opening—and that is only a moment's work, but is often forgotten, and when it is forgotten you will find that through that opening there will be a little oozing of the material. Now clean off the paraffin and seal it again. It is that point overlooked that has made so many people discard this remedy.

I agree with the essayist in what he said about the medicament finding its way into inaccessible canals, but in spite of that there has been a method which has been exceedingly useful as an adjunct to this property. I take a Donaldson broach with the broach barbs cut off, hold it in my fingers against a stone on the lathe, and grind off the sides until I make a very fine three-sided reamer. The stoned surface of the broach makes it rough enough to take up quite a sufficient quantity of the kalium-natrium through the little opening, and that very fine point will go into the canal, so that you have not only the action of your medicament, but also a mechanical reaming action. It has many, many times occurred in my practice, that what has seemed the tiniest aperture could be reamed out with a few turns of this reamer, and this, aided by the action of the remedy, makes a readily accessible opening into the canal.

I am willing to admit that there are

canals the ends of which we cannot reach. That is a most unfortunate circumstance, because, this being so, we are apt to think that we are in the presence of an instance of that kind when we are not. I think that that one fact is of tremendous importance, and most unfortunately so. There are some, however, which seem to be closed, but into which one can operate with this reamer.

I want to say in closing that there is a great deal in what the essayist has said about electrically treating these root-canals, and I can hardly believe that the platinum point will be in any sense of the word as useful as either the zinc or possibly the silver point. The chlorids of these metals are produced, which are antiseptic, germicidal, and exceedingly useful in these conditions. He will tell you that he is so sure of himself when he treats these conditions that he does not hesitate to fill the root-canals afterward, and he did that with me, but I had three days of unhappiness afterward.

Dr. A. N. Gaylord, Philadelphia. I have nothing but the highest recommendation to give you of the kalium-natrium paste, which I have used since my later college days. I think it is one of the grandest things I have ever seen, and it is a surprise to me that it is not more generally used. It is certainly a simple thing to use it, and it has many advantages. It is perhaps a lamentable fact, but nevertheless true, that a great many men in our profession are trying to treat root-canals without first applying the rubber dam. Any man who undertakes to use the Schreier paste will of necessity have to put on the rubber dam —and if it is worth nothing more than that, it is a great thing on that account. I am reminded of a statement made by Dr. Kirk in one of his lectures. In speaking of the importance of using the rubber dam, he expressed himself in these words: "If a tooth is worth a dam, put it on." I think that is literally true, and if men would carry out that idea their success in root-canal treatment would be much greater than it is.

Dr. Rhein in his paper tonight made use of the term "absolute sterility." I would not for one moment discourage myself or anyone else in the effort to obtain absolute sterility, but I feel that that is beyond what we may hope to reach. Everything in that direction is of course beneficial, but when we consider the methods by which the surgeon performs an operation under conditions of sterility, we must take into consideration that his hands are cleansed to a far greater degree than we as dentists can sterilize our hands. After his hands are sterilized he touches nothing but sterilized towels, and sterilized instruments, and the tissues are sterilized by assistants, therefore the tissues that he touches are sterilized. If we were to attempt to undertake operations under similar conditions our instruments would have to be kept in antiseptic solutions, the rubber dam sterilized after being placed on the teeth, and then the teeth sterilized before working upon them. I feel that if we consider these steps in producing sterilization we shall be discouraged as to obtaining absolute sterility.

As to carrying the cocain solution just to the apical foramen and no farther, while I agree with Dr. Rhein that it would be a good thing to stop at that point, we must admit that we are working entirely in the dark. We have not the slightest indication of any kind as to when we reach that point, nor can we, as far as I can see, to any degree of perfection determine the conditions of the root in which we are working. To take an extracted tooth and examine the roots, many of them in a tortuous condition, makes a man wonder what he can do when he works through an opening into that root when embedded in the tissues. Perhaps you are all familiar with the statement of Dr. Cryer that he prefers to diagnose the presence of an impacted tooth by the explorer. We are perfectly familiar with the possibility of determining the presence of bodies by the touch of the instrument. We are all familiar with that in the removal of tartar from the roots of teeth; but in working in root-canals we are working with broaches which are flexible, and I am free to con-

fess that I cannot tell with any degree of certainty what I am dealing with in that canal, because I cannot see it, and the broach does not give me a clear knowledge of the conditions, because of its flexibility.

I have witnessed in Dr. Rhein's office with a great deal of pleasure the use of the electric current with the zinc electrode. I have seen his results and am very much pleased with them. I have discussed the matter with Dr. Rhein, but I am as yet in the dark. He says the material carried into the tissues is zinc chlorid. I do not pose as a chemist, but, from the knowledge I have, I cannot understand where or how the zinc chlorid is produced. If the zinc point be carried beyond the apical foramen and touches the soft tissues, as Dr. Rhein argues, it may come from the sodium chlorid in the tissues, but in the canal, while there may be, and is, a very slight amount of sodium chlorid in the dentin, yet that dentin does not sufficiently decompose to form any chlorin to unite with the zinc to form zinc chlorid, and so far as I know there is no solution placed in the canal prior to using the zinc electrode, and I cannot see how the zinc chlorid is produced. To my mind it would be more natural for the metallic zinc to be deposited, and what would become of the deposit from the action of the tissues afterward I cannot state.

However, I cannot but heartily indorse the paper, and I feel sure that anyone who will take up the use of the Schreier paste will be more than gratified with it. I know of nothing that will destroy the foul odor of a putrescent pulp as that preparation will. I have in my early experience placed in teeth antiseptic dressings, and on taking them out found a foul odor, and had to continue to dress until that odor had disappeared. By the use of the sodium and potassium compound, within a very few minutes this foul odor will be eliminated, and the cotton with which the canal is wiped out will have an odor of the alkali.

Dr. L. Ashley Faught, Philadelphia. I have nothing but words of commendation for this paper. I can only add a few words on some portions of the technique which I have found to be true in my own dealing with roots, the removal of pulps, and their subsequent treatment. The one important point he makes of the necessity—the absolute necessity—of gaining a free opening to the orifice of the canals; here, I feel and have felt for some time, is where a great many fail in their treatment. We must get that. If a house is to be of any value to us in the future the cellar must be perfect, and in like manner all the beautiful tissue we may save is of no use to us unless the foundations be in good condition. No matter what method we use, that is absolutely essential. I feel that this is delicate work, and I agree with the essayist when he suggests that we should approach the operation with truly surgical feelings, and that we must maintain as far as possible sterile conditions. I fear that failure follows, many times, where success would be possible in treating roots, because of the careless methods employed in the work. I feel that I can only add all the force I can command to the advice that one should go about this work carefully.

Then, as to instrumentation, as to broaches, etc., as the essayist suggests, be careful to inspect them before use. I find that is a very important feature, and you will be surprised at how quickly you will discard a broach if you are careful to do that. It is my practice not to use a broach the second time. I have come to such a condition of fear that each case is approached with a new broach.

I want to add a word of warning in the use of other than steel broaches. We do use others, but I always have more fear in their use than with the steel ones. They seem not capable of receiving the same cutting with accuracy. I grow very wary when using any other than steel broaches, and I use a great deal more care with them than I do with steel broaches. They do not seem to stand the wear and tear.

With regard to the point Dr. Ottolengui referred to in his remarks about making solutions with adrenalin, I may

say that I have discarded the use of adrenalin in that relation, because it is a stimulant of the vaso-motor centers, and in a combination with cocain hydrochlorid the cocain will contract the tissues, and then will admit of a rapid dilatation of the vascular tissues and we have the more free hemorrhage following. What peculiar effect this drug in combination with the cocain has on the vaso-motor system I am unable to explain, but that we do have some distressing conditions in its use is true, as Dr. Ottolengui stated.

Dr. P. B. McCULLOUGH, Philadelphia. What Dr. Rhein has presented emphasizes the truth of the asphorism that doing old things well is almost equal to creating new things. The method is not original with Dr. Rhein, but there is no question that it is scientific. Much of the work and of the technique that Dr. Rhein describes has been my practice for many years, and the difference is only in such minor points as are of little moment. For instance, I do not use mercury bichlorid, and I use methods for measuring the diameter of the foramen of the roots so as to fix the size of the gutta-percha cone to fit those with large and those with small openings. I have not used cocain anesthesia to any extent, and I have not used the bottle of adrenalin that I bought when the preparation was first put on the market. One or two applications of this preparation gave me no results that I could not obtain with other preparations already in use. I have not used the pressure cocain anesthesia for the reason that I have obtained the same results with the use of carbolic acid. I recently removed the crown of a vital lateral incisor, reduced the root with a stone, beveled the root, removed the pulp, and discharged the patient in twelve minutes; and that was done with carbolic acid.

Undoubtedly, as Dr. Rhein says, gutta-percha is the most acceptable material to the soft tissues. That has been shown by test, and presented in many articles, particularly in a paper published some time ago which dwelt upon the relative acceptability of foreign materials to the human economy. It showed that a lead bullet was more acceptable to the tissues than a steel one, and it also showed that materials having a smooth surface, such as gutta-percha, were very much less productive of irritation than other materials.

Dr. F. L. FOSSUME, New York. There are a great many things to be considered in the treatment of root-canals. There is no doubt that the sodium and potassium mixture is a most powerful solvent and does much that has been claimed for it in cleansing root-canals; but great periosteal disturbances often follow its use, and nothing is more distressing to the conscientious dentist who has taken all precaution against infection than to have the patient come back in great pain from such treatment. I am not alone in saying this, as many others have had the same experience.

In the case of putrescent root-canals I have had good results with a paste of aristol and formalin, as this will render the decomposing gases inert, and it is very seldom that even a very tender tooth will not become comfortable after being treated with this composition.

Dr. O. T. RULE, Meriden. I wish to ask Dr. Rhein how he applies the sodium dioxid—in powder or in solution? Also why he uses mercury bichlorid instead of formalin.

Dr. RHEIN (closing the discussion). In regard to the point Dr. Ottolengui brought out about the time required, I can only say this: I have been interested in the use of cocain in every form presented, from the day it first landed in this country. With Dr. Morton of New York I made a number of experiments in regard to the use of cocain in various ways, and especially by means of cataphoresis. I came to the conclusion that there was only one form of this drug which was readily forced into the tissues or organs, namely, the hydrochlorid, and that it must be in aqueous solution. Just as soon as we depart from the strictly aqueous solution of cocain we produce a substance which impedes its own progress in some form

or other. Alcohol and the essential oils act upon the surfaces so as not only to impede the effect, but so as to frequently impair and nullify the possibility of the osmotic effect of the cocain.

Dr. Fossume. How about glycerin?

Dr. Rhein. I said any preparation outside of the strictly aqueous solution, and glycerin, while it has much water in it and takes up water readily, unquestionably meets with the same objection, as was demonstrated by experiment at that time. I simply give this as the result of our experiments, and in substantiation of it I will say that at that time I tried alcoholic solutions, and failed utterly to get the same results as with the aqueous solutions.

In regard to the time of producing anesthesia, all I can say is that if I do not succeed in producing instantaneous anesthesia, my conclusion is that there is something wrong with the technique, and therefore I limit myself to twenty or twenty-five seconds. Of course there are what might be termed failures in the total anesthesia of the pulp. This is rather to be desired. In my desire not to force the anesthetic solution beyond the apex I have sometimes failed to go to the end, and every time the patient flinches I am rather glad, because I know that I have not forced anything through the foramen. After I remove the pulp I begin to look for sensation in the apical region. There is, however, another source of failure, and that is in multi-rooted teeth, where sometimes the cocain will be forced into some of the roots and not into others; of course there are times when additional pressure on these individual roots has to be used. Outside of that, it does not make any difference how much of a nodular mass is present in the canal. I have had failures temporarily, as Dr. Ottolengui has said, but they have been failures of the technique at the time of working. There has been no failure where I have succeeded in getting the cavity in such a condition that direct pressure could be brought to bear upon the pulp, with no possibility of the cocain going in some other direction. The solution will naturally go in the direction of least resistance, and if there is any possibility of escape from the canal, the solution will be sure to find it.

In answer to the question whether the cocain is taken into the circulation, I can only say that I have never seen a single patient show the constitutional effect of cocainization from pressure treatment in my hands, and therefore I cannot believe that the cocain enters the circulation. I don't say it is not possible, but I have never seen a case, although I have had many cases of post-operative accidents from cocain used by injecting into the soft tissues.

In regard to the use of adrenalin, Dr. Ottolengui brought up the question of hemorrhage. I did not go into that in my paper for the reason already mentioned—I did not want to lengthen the paper. Hemorrhages do occur occasionally, but adrenalin is never indicated in these cases; its use to me would be similar to the pouring of kerosene on a fire while trying to put it out. Adrenalin, while it contracts the vessels the same as cocain, gives an after-effect which is very deleterious, leaving the vessels wide open—effects which are not desirable.

With the Schreier paste I have had several cases where there was a tendency to hemorrhage on the return of the patient, but they have been easily controlled by the use of some of the hemostatic agents. There are cases of hemorrhage where there is a large vessel in the pulp; there are the bleeders—the hemophiliacs. This class of patients are liable to severe hemorrhage in the use of any agent that primarily contracts the bloodvessels.

Dr. Ottolengui, in his closing remarks, spoke of the three days of discomfort after the use of the electric treatment of the periapical region, and in speaking of that subject I will try to answer the question of Dr. McCullough as to the extent of the diseased area in these conditions. I know how much the diseased area is when I treat it, because I take a radiograph of such a tooth, and that outlines to me definitely the extent of the diseased area. There is nothing that the radiograph outlines better than the

extent of this diseased area. I do not attempt to cure by this means a root in which the outer periphery is necrosed, although I heard Dr. Hoffendahl make the statement that he had done that sort of thing. Such a case is better treated by surgical means than by electric treatment. In cases where there is a small area of infection, what is known as "blind abscess" or something of that kind, the forcing of the galvanic current through the canal is bound to destroy every micro-organism that may be present there. It destroys those existing and inhibits the development of others, and the zinc chlorid cauterizes the tissue.

Dr. Gaylord wanted to know how the zinc chlorid is formed. I am not a chemist myself, but I take my data from chemists. They assure me that there is sufficient chlorin generated in this manner to form zinc chlorid. That is the chemistry as outlined by men like Kirk, Morton, and Buckley. I made the experiment of taking the zinc point and passing it through a piece of raw beef, lying over the albumin of a fresh egg, and the albumin was coagulated as beautifully as if poached over the fire. I know very few agents outside of zinc chlorid that will do this as perfectly as it was done in this experiment.

Dr. Gaylord asked about the possibility of reaching the very apex of the foramen. I do not reach the apex of every root. I do not want to reach it in every root, because there are certain cases where the end of the root is sealed with inorganic matter in such a way that the apex cannot be reached except by drilling. There is no necessity in such cases for reaching the end of the canal. What I claim for the sodium-potassium is that it will reach every particle of organic matter, and in those cases where the apex cannot be reached it is immaterial whether or not a small portion of inorganic matter is left in the root.

In speaking of Dr. Ottolengui's case, where he had three days of discomfort, I want to say that his case was one in which the root was wide open, and a good portion of the periapical region was involved, and we had to cauterize it to a great extent. I believe I made an application of 7 or 8 milliamperes, more or less, for eight or nine minutes. My recollection is that I applied the current for a considerable length of time, because there was an extensive area that I wanted to destroy, and of course there is bound to be considerable discomfort in a case of that kind. The cauterization of this tissue is followed by resorption, which action is more or less painful. I have had cases of this kind where I have had to prescribe morphin in order to relieve the patient from pain.

One gentleman asked my method of using the sodium dioxid. I have never used the sodium dioxid, because at the time it was introduced I said there were two methods, this and Dr. Schreier's, and I took the Schreier method because it was easier, and the more preferable of the two. Some might prefer the other, and there is no reason why the same results could not be obtained in that way. Another gentleman asked why I used mercury bichlorid in preference to formalin. I use it because it is a better germicide than formalin. It stands out as the only real germicide we have at our command, and a certain portion of it is deposited in the tubuli of the teeth.

Dr. Gaylord spoke of absolute sterilization. I realize that such a condition is practically impossible, and what I meant was that we should use every precaution at our command to bring us close to this condition; when I used the words absolute sterility I referred to the condition of the canal, and there we must have absolute sterility; if we fail at that point our operation is a failure. Because we cannot have absolute sterility in all the surroundings is no reason why the canal cannot be absolutely sterile, and I defy anyone to find any infectious material in a canal treated in this manner.

On motion the subject of Dr. Rhein's paper was passed.

Dr. JAMES MCMANUS, Hartford. While the gentlemen are with us, I want the society to express their appreciation of the papers presented, and the interesting and amusing manner in which the

discussions have been conducted this afternoon and evening. I move that a rising vote of thanks be given to the gentlemen for their presence, and for the very interesting and instructive papers presented.

The motion was carried and the society extended a vote of thanks to its guests.

Motion was then made and carried to adjourn until the morning session.

WEDNESDAY—*Morning Session.*

The meeting was called to order Wednesday morning, April 19, at 10 o'clock, by the president, Dr. D. W. Johnston.

The first order of business for the morning session was the reading of a paper by Dr. F. L. FOSSUME, New York, on "A New Method of Removable Bridge Work."

[This paper is printed at page 1313 of the present issue of the COSMOS.]

Discussion.

Dr. JAMES MCMANUS, Hartford. I do not like to see the time wasted, and for that reason will say a few words on the paper of Dr. Fossume. The exhibition of this work shows us the advantages of cleanliness. I want to make this one remark: Our profession is essentially a mechanical one; it implies the education of the hands, and while we are educating our hands we have been trying to educate the public to where we will be classed with the other professions. If anyone present has ever before questioned our right to be classed with the other professions, they cannot, since this beautiful exhibition, question for a moment that dentistry as practiced today shows our wonderful ability as mechanics, bridge-builders, architects, and artists. The style of work we have just looked at shows the highest order of art and mechanics. It is the real artist's work in its relations and practical use in the mouth. For one, I have been more than pleased to have the opportunity to witness the work of Dr. Fossume, and I think he deserves, and we should give him, our hearty thanks for coming here and giving us the opportunity to see and inspect this work.

Dr. A. N. GAYLORD, Philadelphia. I can see great advantages to be gained in certain cases by this work, but in others I see great disadvantages. I think we have all seen cases where our fixed bridges produced irritation to the gums. The gums become congested from the pressure against the bridge, and in some cases the bridge will become very nearly covered with gum tissue; I have seen two or three cases of this kind which were most difficult to handle. This of course is a removable bridge, but the bar which runs across from abutment to abutment, coming in close apposition with the gum, I think will be difficult to keep clean, and in case of irritation it would naturally press against the gum and cause further congestion. This may possibly not be the case with this kind of bridge work, but I know it does exist with fixed bridges, and I see no reason why the trouble should not occur here in the same way. Another point: I am inclined to think that, owing to the fact that the teeth rest on a piece which is more or less yielding, the point of attachment between this bar and the gold cap in the lower case will have to be considerably strengthened, or the gold cap will be torn or broken away from the bar connecting it.

Dr. HENRY MCMANUS, Hartford. If you propose to make objection to this kind of work on the wilful admission of lack of skill, of course the bridge will not succeed. Dr. Fossume showed me the models yesterday, and I hail with delight this method, for it strikes me as the most practical and scientific thing introduced into dentistry in a great many years. We are building bridges, and we have had many failures, not from the lack of skill of the operators but because the bridges have been built on wrong principles. When a man builds a bridge the thing that demands the most attention are the foundations—the abutments. When he gets his abutments

properly fixed, he builds the framework, ties it all together, and he has his bridge. When a dentist builds a bridge, he takes some abutments hardly strong enough to support the crowns, makes a bridge, sticks it on, and in many cases trouble ensues almost immediately. When it does not cause trouble it is more or less a matter of luck. Dr. Fossume has secured his abutments, and built his bridge in such a way that they will have lateral support, and it seems to me a good idea. I had the misfortune once to build a bridge for an architect. He had been interested in all kinds of bridges, and had made some study of dental bridges. He told me that in building a railroad bridge he figured out mathematically the strength of the abutments, and that the factor in the railroad bridge was a plus. He said it seemed to him that the factor in a dental bridge was a minus. It appears to me that Dr. Fossume's method of strengthening the abutments, and the lateral bar fitted to the gum, has taken away the minus.

Dr. FOSSUME (closing the discussion). Dr. James McManus spoke of the fact that although we are surgeons we are pre-eminently mechanics. There is no operation that can be performed in the mouth that is not a mechanical one, from the scaling of the teeth to the construction of an inlay. No matter how scientific one may be, if he be not a natural mechanic he will certainly cause himself much trouble, give his patients much pain, and have many failures which he would not have had had he possessed the requisite mechanical ability.

The point Dr. Gaylord brought out about cleanliness is a very proper one, and I am glad he mentioned it. The first piece of this work I put in was in January, and I have had occasion to see it constantly since that time, and there is no inflammation of the gum tissues around the bridge. It looks as healthy and clean around the bar as when it was first placed in the mouth. There should be a space there allowing a strip of sandpaper to be passed in between the gum and the bar, so that it can be polished underneath. Then when it is cemented in the mouth the edges of the bar where it meets the gum line will be rounded.

The subject of Dr. Fossume's paper was passed.

The President announced as the next order of business the reading of a paper by Dr. JOSEPH HEAD of Philadelphia, on "The Adhesive Filling."

[This paper is printed at page 1322 of the present issue of the COSMOS.]

Discussion.

Dr. L. C. TAYLOR, Hartford. I can fully sympathize with all that Dr. Head has said this morning, and can indorse the paper as a whole. I wish, however, to make one or two suggestions with regard to the method of starting these fillings. One little point in the starting of a filling in this way, as I am inclined to see it, he did not speak of, and that is the benefit of heat in packing the gold against the cement. When the first piece of gold is placed in position, whether moss fiber, Watts' crystal, or any other form, I find it a great help to take a hot burnisher, heated beyond the boiling-point of water, and put it right against the gold. Do not press it too soon, but press gently and vibrate it. It will drive the air from the pores of the gold, into which the cement will be driven, thereby making a closer union between the gold and the cement, which will give it more support than if pressed with a cold instrument. I do not doubt that this can be done with a cold instrument, as I have done it myself with excellent results, but I think this little point is an improvement in the starting of the filling.

I wish to differ with him in using cement as a lining to amalgam fillings. While I think results are better than where amalgam is used alone in contact with the tooth-structure, I have taken out large fillings of this character where there has been a contraction in the amalgam which affected the cement in five years after the filling was made. To avoid this I mix the cement and amalgam for the first half of the filling. I

get not only a mixture, but in bringing the amalgam into contact with the cement it partakes of the nature of cement more than of the amalgam—it becomes soft, pliable, and sticky.

I made the statement a few years ago that not over fifty per cent. of the fillings inserted would not be after five years liable to criticism, even finished by the best operators in the profession. If that be the case, what can we expect of those who never do a good piece of work? I have been criticized for that remark by some, who thought possibly that I put it too strong. However, I believe the essayist is right, and I believe that the time has come when the progressive man must discard the idea of putting gold and amalgam directly against the tooth-structure. There are better methods known today, and they are being introduced here, there, and everywhere. I am getting letters every little while speaking about it and asking questions, many telling me that the method has helped them very much. I am often asked the question, Will it save time? I do not know and I do not care whether it saves time or not; I am trying to save teeth. If we can take a little more time, and make better fillings, let us do it. In cases of thin enamel walls on front teeth, take this method; use the hot burnisher, and burnish the cement and gold to the wall until you secure a good, strong connection that will last for years, that will not disfigure the tooth or spoil the color, and that will be a beautiful piece of work, a monument to the man who does it.

Dr. A. J. Cutting, Southington. I recall the time when Dr. Taylor in his office showed me this method, and said he had for several years been filling teeth by inserting a lining of cement and putting in the gold or amalgam on that before the cement had hardened. He thought it original with him, as he had not found anybody else doing it in that manner. I did not know that I was doing it anybody's way, but I had been doing it for years prior to the time Dr. Taylor showed it to me, and that was a number of years ago. I cannot tell exactly how many years I have been using the method, but as time went on, in working for patients I have run across cases that were done as far back as 1892 on my own patients of whom I had kept records. However, I claim no priority in this method, for I probably took the idea from some journal, although I do not know where or when. We all know how cement fillings save teeth from further decay, but the cement disintegrates, and I reasoned that if cement would save tooth-structure—barring washing at the cervical margin—better than any metal, then why would it not be a good idea to line the metals with it? So I did it, and as the years have gone by I have kept records of the cases, and have no reason to regret the filling of teeth in this way.

Now, I take a theoretical stand that I think is in advance of anything I have heard. As the inlay fad has come into being, we are told that teeth are being saved with these inlays better than by former methods because of the lining of cement. In lining metal fillings with cement we have been careful—I am today—to have all the cement removed from the margins. And why? If an inlay with the cement coming clear to the margins will save the teeth and last, then why should we be so particular to get all the cement away from the margin? For you get a connection as close with your gold and amalgam as you get with an A No. 1 inlay. I find, however, in examining inlays that are saving teeth—I find in the majority of inlays I see—that after a period of time there has been a washing away of the cement. I see some cases beautifully made, ideal cases, that do not wash out. Now, my theory is that fillings made with no line of cement at these margins will save the teeth better than the best inlay made.

Although I may disagree with the essayist as to his statement of percentage of failures, I believe he has given us a most admirable paper. My experience would not bear out so large a percentage of failures in gold fillings *versus* amalgam in the same class of teeth. I believe amalgam is the greatest help to us as dentists, but I do not believe personally that there is so large a per-

centage of failures of gold as against amalgam under the same conditions. I was very pleased with the paper. I have got into the method of using cements so thoroughly that I very seldom put in either gold or amalgam without a lining of cement.

Dr. F. L. Fossume, New York. In 1893, the great plastic worker, Dr. Flagg, made a statement of this method, and I have practiced it ever since, and read a paper on this subject before the New Jersey Dental Society. I have been very much surprised to find how few men use it, and many ask me if the soft cement does not destroy the cohesive quality of the gold, as is the case when gold becomes moist. It certainly does not have this effect.

Dr. L. C. LeRoy, New York. With regard to this method of using cement in combination with the metals, I think Dr. Priestly of New York, demonstrated that method as early as the eighties. I remember being present on one occasion when he showed that feature of placing zinc oxyphosphate in the cavity first, and before the cement had hardened he placed the amalgam or gold. I think that was as early as 1886 or 1887.

Dr. S. C. G. Watkins, Montclair, N. J. I used this method as early as 1886, and have used it since that time. I spoke of it before the American Dental Association soon after I adopted it.

Dr. Draper. Is there any danger in using the oxyphosphate so close to the pulp in a deep cavity without lining it with gutta-percha?

Dr. Head (closing the discussion). First I will speak of Dr. Taylor's remarks in regard to the suggestion of heat on the cement when the gold is pressed upon it. I may say that there is a certain amount of value from pressing a hot instrument against the sponge gold, so as to slightly hasten the rapidity with which the cement sets, to prevent the rocking; but as cement when subjected to heat sets very rapidly, and since the gold would be a means of transmitting the heat to the cement, I should think that when the gold started to cool there would be no suction on the cement, particularly next to the gold, and the cement at that point would become absolutely crystallized. However, that has nothing to do with the case in point. I can imagine the hardening with a hot instrument might be a good way.

If amalgam expands or contracts to such an extent as to cause the breaking up of the cements, I should be tempted to change my amalgam. Speaking of the expansion of amalgam, I truly feel that any man who uses an amalgam made by Dr. Black's formula will have no such trouble. In any case where there is this periodic expansion and contraction, if the cement next to the tooth is going to be powdered, I cannot but feel that the contraction and expansion of the amalgam in the cement would be more disastrous because it would be exerted at greater advantage. Still, a great many good workers do use this method of putting the cement and amalgam together so as to get a mixture of the amalgam and the cement and have a certain advantage of both. It is a method worthy of consideration, and should be observed and experimented with in the future.

I want to thank Dr. Taylor for taking up my statement about the percentage of failures of gold fillings *versus* amalgams. When I made the statement that no man who had been practicing thirty years would be able to place his hand on his heart and say that fifty per cent. of his work was still in position and free from decay, I was sincere in that statement. There may be some, however; but the only way they could be sure would be by having a set of statistics showing that half of these fillings were in the mouths of patients who had died before the fillings were two years old.

The remarks of Dr. Cutting were very much to the point. I think I said that the purpose of my paper was not for comparing the gold fillings of olden times with the modern fillings, but simply to show that the records of adhesive fillings made were of such value that we need never make any other kind. When we consider the danger of fracturing the enamel walls when hammering the gold,

which is avoided to a great extent by the use of cement, I think the method is a very valuable one, because by using cement the poorest worker can make a better joint with the tooth than the best gold-worker that ever lived can make by the old method. The question of superiority of this method over the inlay is only a question of degree. The inlay lasts—we know it lasts, and in spite of the fine line, and in spite of sometimes coarse lines, it lasts, and we know that the finer the line the better it lasts, and therefore on the theory of limits, the filling that has no line at all will last the best of all. And so I bring forward this paper with the idea that I am giving you practically a gold inlay or filling that has all the advantages of the inlay combined with those of the best gold filling ever put in.

Dr. Cutting spoke of a man putting in amalgam fillings carelessly. Gold is a material that requires the nicest and most conscientious care in the world. The man who puts in a careless amalgam filling will as surely put in a careless gold filling. He may take more care with his gold fillings because it is more difficult to do; because it may drop out. He will have to take more pains, but taking these pains will not result in as good a joint with gold as with amalgam, and it is the joint, after all, that has to do with the ultimate success.

As regards oxyphosphate killing pulps, have you ever killed a pulp with phosphoric acid? Whenever you have a pulp you want to destroy, just expose it and put oxyphosphate on it. I know that any man who has used zinc oxyphosphate knows that it is the best tooth-preserver we have. Pulps die under it, but who shall say whether the pulps die from a previously existing infection or not. I assure you that oxyphosphate will not bring a pulp to life again, but it has been the experience of inlay workers for the last twenty years that oxyphosphate saves teeth; that in deep cavities it does not act as a nerve irritant, does not destroy the teeth or endanger the pulp. I can only say that the general experience of the profession at large proclaims that zinc oxyphosphate does not endanger the vitality of pulps.

The subject of Dr. Head's paper was passed.

The President announced as the next order of business the reading of a paper by Dr. S. Freeman of New York, on "The Use of Compressed Air in Operative Dentistry."

The report of the Committee on Nominations was called for, and Dr. Eberle presented the following list of nominations:

President—Dr. E. B. Griffith, Bridgeport.

Vice-president—Dr. A. W. Crosby, New London.

Secretary—Dr. Frederick Hindsley, Bridgeport.

Treasurer—Dr. W. O. Beecher, Waterbury.

Assistant Secretary—Dr. W. V. Lyon, Bridgeport.

Executive Committee—Dr. E. S. Rosenbluth, Chairman; F. W. Brown, New Haven; C. C. Prentiss, Hartford.

Librarian—Dr. R. H. Keeler, New London.

Editor—A. H. Spicer, Westerly, R. I.

Dr. Gaylord moved that one ballot be cast by the secretary for the entire list of nominations.

The motion was carried, and after the secretary had cast the ballot, the president declared the entire ticket elected.

The President appointed Drs. McManus and Strang as a committee to escort the new president to the chair.

Dr. Johnson, in transferring the office of president, said: I present you with the gavel of this society, and with it all of the honors and emoluments accompanying the office; and my only wish is that the members of this society be as loyal to you during the coming year as they have been to me during the past year.

Dr. Griffith, in accepting the gavel, said: Gentlemen of the Connecticut State Dental Association,—I want to offer my sincere thanks for the honor you have bestowed upon me, and I feel that with the same help and support

which has been given to each president for the past number of years the coming year will be as successful as any of the previous years. I should not feel that I could go on with the duties of the office without the full support of the members of the association. I really believe that the president is but a small part in the machinery of the society as it works today. The society seems better equipped each year to perform the duties which devolve upon us. I thank you again, gentlemen, and I promise to serve to the best of my ability during the coming year.

Dr. JAMES MCMANUS. I offer a motion that the members of the society thank most heartily the essayists and clinicians for honoring us with their presence this year and for furthering the interests of the meeting.

The motion was carried.

Dr. HENRY MCMANUS. We have thanked the essayists and clinicians, and we have another body of men who have aided materially in the success of the meeting, and I want to offer as a motion that this society offer its thanks to the exhibitors, who have added so much to the success of our meetings during the last ten years.

The motion was carried.

Dr. STRANG. I would like to move that a vote of thanks be extended to the DENTAL COSMOS for sending their representative, Dr. Anthony, to report the meeting.

Dr. JAMES MCMANUS. I want to amend that by adding that we thank them for the splendid reports made by the representative of the DENTAL COSMOS in the past few years, and for the pamphlet editions of our proceedings. They make a very valuable record for our society, and in the pamphlet form are very easily filed, and I think that individually and as a society we should be very thankful to the representative and to the management of the COSMOS for giving us such good reports for the past several years.

The amendment was accepted by Dr. Strang, and the motion was carried.

The President, after calling attention to the clinics to be held during the afternoon, declared the meeting adjourned until the next annual session.

DENTAL SOCIETY OF THE STATE OF NEW YORK

Thirty-seventh Annual Meeting.

(Continued from page 1269.)

FIRST DAY—*Afternoon Session.*

(Continued.)

On motion, the society proceeded to the election of officers for the ensuing year.

The PRESIDENT. I want to thank you most heartily for the courtesy you extended me a year ago by electing me your presiding officer. At the same time I wish to say, so as to save time in case anyone has it in mind to cast a ballot for me for a second term, that I am not a candidate for re-election, and you will kindly prepare your ballots for someone else.

Dr. HOFHEINZ. I think I voice the sentiment of the entire audience when I say that I hope you will reconsider this action, and I move that the secretary cast one ballot for Dr. Jarvie to succeed himself.

Dr. JARVIE. Gentlemen, I do not say this without consideration. I don't think there could be anything harder for me to say than I have said, when I recognize the kindness expressed in the proffered honor, but I assure you that under no condition can I accept re-election.

Dr. JOHN I. HART. After consultation with the vice-president, I take pleasure in nominating Dr. W. J. Turner of Brooklyn for president for the coming year.

The election was proceeded with and resulted as follows:

President—W. J. Turner, Brooklyn.
Vice-president—W. A. White, Phelps.
Secretary—C. S. Butler, Buffalo.
Treasurer—C. W. Stainton, Buffalo.
Correspondent — Ellison Hillyer, Brooklyn.

Motion was then made and carried to adjourn until the evening session.

FIRST DAY—*Evening Session.*

The third session was called to order Friday evening, May 12, at 8 o'clock, by the president, Dr. Jarvie.

Dr. BURKHART, chairman of the Business Committee. The clinics will commence at 9 o'clock tomorrow morning and continue until 11, at which time the papers and reports that cannot be finished this evening will be considered. It is the wish of the officers of the society that all members will remain until the close of the morning session, as we expect to finish all of the business by 1 o'clock tomorrow.

The next order of business as announced by the president was the report of the Law Committee, by Dr. Wm. Carr, chairman.

Dr. CARR read the report.

Dr. HART. I move the adoption of the entire report, including the recommendations therein contained.

Motion carried.

The President then called for the report of the Committee on the President's Address.

Dr. OTTOLENGUI, chairman of the Committee on the President's Address, reported as follows: Your committee as appointed by the president, Drs. Perry, Hofheinz, and myself, have met and considered the president's address, and we highly recommend the adoption of the suggestion of fellowship as outlined by the president. We have nothing to add to the plan suggested, but we think that

the gentleman who has conceived this plan and has so generously donated the fund, and who so modestly refused re-election, should have the honor of naming the first committee, and it is also the desire of the committee that Dr. Jarvie be instructed to appoint himself thereon, and that he be himself the chairman of this committee, to serve for five years.

The foregoing having been presented in the form of a resolution was duly seconded and adopted as a standing resolution.

The President then introduced the speaker of the evening, Dr. J. P. Buckley, Chicago, Ill., who read a paper entitled "The Chemistry of Pulp-Decomposition with Reference to the Discoloration Problem; and a Rational Method of Treating These Conditions."

[This paper is printed at page 1302 of the present issue of the Cosmos.]

Discussion.

Dr. M. L. Rhein, New York. What I may have to say on this subject will deal perhaps altogether with the practical side of Dr. Buckley's paper. I believe this society is especially fortunate in having been favored with the essay that we have just listened to. This paper, in addition to the admirable one presented by the essayist before the Fourth International Dental Congress at St. Louis last summer, is one well worthy of the careful study of every dentist. We have been listening today and for some time past to the developments that we have made in every department of dentistry. This one field stands out almost alone as the one in which the major portion of the profession are practicing today practically what they did twenty-five years ago. I say that advisedly, after considerable delving into the methods of practice of different men throughout the country. And that means this: That the practice of the majority of dentists in regard to pulp and root technique is practically an empirical one. It is based on no scientific procedure, but it is a sort of makeshift practice in which the dentist starts the work with fear and trembling as to the possibility of an alveolar abscess, pericementitis, or something of the kind meeting him on short notice. The work that has been presented to us in the last year by the essayist, supplementing as it does the admirable work done by Dr. Kirk on the same subject, is one that leaves no excuse to the dentist today for continuing this sort of practice. It has always been unscientific, always below the standard of every part of the practice of dentistry, and those of us who desire to feel that we are practicing dentistry scientifically have no excuse in the future for filling up pulps with embalming materials, or filling roots with medications meant to alleviate the troubles that may ensue in future years. There is a lesson to be learned from this paper. The lesson as taught by the essayist is this—that it is necessary in pulpless teeth to remove every particle of organic tissue that we find in the pulp-chamber and in the root-canals, and as far as possible to remove as much of this organic tissue from the tubuli of the dentin itself, and the essayist has shown us a method of procedure which his own experience has taught him is successful.

Without going into the discussion of, or taking up the question of the chemical compounds that the iron forms, whether the essayist be correct or not in the chemical conclusions he has so admirably brought out and to which he holds so logically, this theory must stand and will stand until it is chemically controverted. Whether or not it stands ultimately, he has strengthened his case beyond peradventure to a position where it is simply a question of chemistry.

There has been some question as to whether fat is present in putrescent forms of pulp tissue as we find them and in the end products. As clinicians, I believe the majority of us are ready to substantiate the essayist's position that we undoubtedly come in contact with various form of fats in the putrescent forms of pulp tissue. Now, it is not a question of the essayist's form of practice being the only successful way of meeting this problem. There are many chemical methods by which we can ac-

complish precisely what the essayist has so admirably presented to us. It is a great pleasure for me to substantiate almost everything, in fact I may say everything I have listened to tonight, because for a great many years I have in my own humble way been endeavoring to bring about a change in the sentiment of the profession in regard to the methods of handling pulpless teeth, in regard to the necessity of accomplishing exactly what the essayist claims to accomplish; and it is on that account that I feel so strongly impelled to stand here and give my evidence as to the clinical correctness of the position he has assumed. My own individual practice in this form of work, while in its technique it may seem at a glance widely different from a chemical standpoint, covers precisely the same ground. I have invariably believed that as soon as a tooth of this kind is opened into the pulp-chamber, every portion of the contents of that pulp should be removed at that initial sitting, that not a particle of the contents should remain. In 1893, at the Columbian Dental Congress in Chicago, at a clinic there given by Dr. Schreier of Vienna, he presented to us a preparation of sodium and potassium which in its way was a revelation to myself when I saw it in operation at that clinic. It accomplished precisely what Dr. Buckley claims to accomplish—that is, whatever fats were present in the end products were at once disintegrated into saponaceous compounds. Every particle of organic tissue that this preparation comes into contact with is immediately disintegrated and broken up in such a form as to lose its effects, whether in the form of cadaverin or putrescin. The compound is at once changed from an extremely toxic compound into one that is perfectly harmless. Now, the technique that Dr. Schreier presented to us I looked upon as faulty, because he simply used the remedy for this purpose and left these inert and harmless substances in the canal, and paid little attention to the point whether the teeth would become discolored or not; but for practical utility it answered all purposes. I took up the work at that stage, and my first effort was to remove with extreme care as much of the pulp tissue as possible according to the stage of putrescence present, realizing the necessity of not forcing any putrescent matter through the end of the root, and I then used the sodium and potassium mixture to disintegrate whatever portion remained. After disintegrating it I proceeded on the same lines as outlined by Dr. Buckley, and washed out the root-canals with a substance that would not only cleanse the root-canals, but would set oxygen free in the canals and thus bleach any compound that could be bleached by the presence of nascent oxygen set free. For this purpose I used a preparation that I had been using for about eighteen or nineteen years, namely, a solution of mercury bichlorid, one part in five parts of hydrogen dioxid, washing out the canals by means of a syringe. Most of the disorganized matter is immediately forced out by the pressure of oxygen set free in the canals, which also assists in removing any pigmentary discoloration that free oxygen can bleach. We also get the benefit of the minute residue deposited in the tubuli of the root. This substance, mercuric chlorid, is the most potent germicide that we have at our command. My clinical experience with this form of technique has only served to emphasize in my own mind the wonderful utility of this method, its absolutely unfailing certainty in every case. Now, in this technique, as in that presented by Dr. Buckley, the essential thing is the necessity for thoroughness. If we want to keep the tooth from further discoloration we have to get rid of the putrescent substances not only in the canals but in the tubuli themselves, and the penetrating effect of sodium and potassium for entering into the finest passages is most potent for this purpose.

In presenting this method I do it with the feeling that it is a pleasure to be able to stand here and present a method of accomplishing what the essayist has done with a widely different technique, yet accomplishing practically the same purpose from the same scientific standpoint. And the appeal that I would

make is that gentlemen who are not familiar with the form of work as presented to you tonight by Dr. Buckley, will make a special study of what he has written on this subject, and if you will carefully follow it out I believe that the day of creasote and iodoform treatment of root-canals will become practically a day of the past with you—that you will rise from what has been in the past a form of empirical work to one of what I consider scientific practice.

Dr. HOFHEINZ. I do not feel competent to discuss this subject from its chemical standpoint, not having had an opportunity of studying the paper. I thought when Dr. Kirk had written his famous essay on bleaching, that it was about the finality the dental profession had to expect on the subject.

I would like to ask Dr. Buckley a few questions in connection with the paper. He said that hemoglobin was not found in combination with sulfur. Is it not possible that through some external opening enough putrid material can get in there to form a compound with the hemoglobin, which Dr. Miller calls sulfomethemoglobin and which he considers to be the cause of green stain? The other question is, Why is sodium dioxid a more powerful bleaching agent than hydrogen dioxid? Is it because it is a stronger oxidizer than hydrogen dioxid, twenty-five per cent., or is it because sodium dioxid forms a by-product which in itself makes it more valid? Dr. Buckley spoke of formalin combining with ammonia, and as such being the most powerful and most recommendable material in the treatment of putrescent root-canals. I wish to ask, Is ammonia at all times present in putrescent canals?

One other question is whether the essayist has had experience with the treatment of pulp-canals with electrolysis. We had in my section at the Fourth International Dental Congress a very interesting paper by Dr. Hoffendahl of Germany, in which he claimed a great deal for the treatment of pulp-canals with electrolysis. He claimed that in connection with an alkaline medium the positive pole of a galvanic battery was capable of depositing chlorin, hydrochloric acid, and oxygen, which have a decided germicidal effect on the contents of the root-canals. I want to know whether the essayist has had any experience with that, and whether he gets with it any good results in the treatment of root-canals. I have used electrolysis in the treatment of these conditions and I believe I have been in some instances more successful than with anything else, especially in cases of so-called blind abscess.

I think one of the greatest practical points brought out in the paper is the fact that we must change the chemical nature of the contents of the pulp-canals before we can begin to bleach the tooth proper, and that I think is one of the facts that many practitioners have almost invariably overlooked. It is about time that we should understand the chemical decomposition of the pulp itself, so that we can unite in using one material in the treatment of root-canals instead of having innumerable individual methods and medicaments. I wish to personally express my thanks to Dr. Buckley for the paper.

Dr. W. C. WILBUR, Corning. I am sorry I cannot discuss the paper from a scientific or chemical standpoint as thoroughly as it deserves to be, although I had the pleasure of reading several times the article some time ago. Since that time I have been pursuing the method of treatment advocated by Dr. Buckley and I am greatly indebted to him for it. It has changed my whole idea of pulp-canal treatment. I would just like to say that since I have been using this method it has acted like magic upon conditions that have come into my hands. Teeth that have been in an abscessed condition and about to break, and in all stages of putrescence, having sealed this tricresol and formalin equal parts in the tooth, invariably in twelve hours the teeth have been perfectly quiet, the soreness disappearing entirely. I hesitated a long time before using this

method, and yet the practice seemed every time I read the article so reasonable and Dr. Buckley proved each stage of the process to be so scientific and positive that I felt I must try it. I have sealed this in sore teeth which I thought would be abscessed by morning, but to my perfect astonishment in every case I have treated, the teeth in twelve hours have become quiet, so that the patient could bring the teeth together without soreness.

Dr. Buckley (closing the discussion). I was more than pleased with Dr. Rhein's discussion, outside of the flattering remarks pertaining to myself. Sometimes I enjoy a discussion if there is a little more dissension, although I am not altogether averse to the kind of discussion we have had this evening.

The tendency in medicine is toward rational therapeutics. As Dr. Rhein has said, dentists have been satisfied to go along with empirical methods of treating teeth, studying porcelain, learning how to put in inlays, experimenting with amalgam, saliva, etc., and yet they seem to have been satisfied with the old methods of treating teeth. We should *not* be satisfied, because we have not been getting the results we should get. We should try to agree on a rational method of treating these conditions.

I was gratified with the remarks of Dr. Ottolengui, and I hope you will try this remedy. It will only cost you fifteen cents to give it a trial, and I know you will get satisfactory results.

One of your New York men, Dr. Herbert Wheeler, started me to thinking along this line. He said, in an article that was published in the Dental Cosmos some years ago, that he did not see what the coagulation of albumin had to do with selecting drugs for the treatment of putrescent pulps. I had been working on the chemistry of pulp-decomposition at that time, and I did not believe there was any albumin in putrescent canals. Many previously had made the statement that there was no albumin in putrescent pulps, although they assigned no reason for the belief, and, contrary to my learned teacher, Dr. Harlan, I did not believe that there was any albumin in putrescent pulp-canals, and I went to work to figure out the chemistry upon which I could base an opinion, and at the same time I tried to figure out a rational method of treating these conditions; and I offer this as that rational method. Drugs have been selected solely with the idea of killing germs. There are other things besides germs to be disposed of—and here is where the question comes in as to whether microorganisms can cause suppuration and inflammation. They can break down the tissue and form by-products which are capable of producing inflammation and suppuration. There is also the question of whether fats are present in the original pulp tissue. I knew that a great many men had claimed that there was no fat present there, and there were others also who claimed that there were no carbohydrates, as such. Here we have two opinions coming from sources that we respect. It does not matter, however, whether there are fats in the original pulp tissue or not, chemists have proved that fats result from the decomposition of proteid substances, and necessarily found in putrefactive pulp-canals, therefore our object should be to chemically convert these into harmless substances.

In regard to the advantages of using sodium dioxid over hydrogen dioxid, I will say that since using this rational method for treating these conditions I am not so particular about using the sodium dioxid as a bleaching agent.

The value of sodium dioxid is that we can use it for treating putrescent canals and for bleaching at the same time. It is used practically the same as Dr. Rhein uses the sodium and potassium. It unites with water, liberating oxygen and forming caustic soda, and this alkali acts upon the fats in the root-canals and converts them into soaps which are soluble, and by washing out the soap we mechanically remove the compounds of iron that have been formed, and which if left will ultimately stain the tooth. But since treating the teeth by using formalin and tricresol we do not need

the saponifying action of the product. However, if you care to use sodium dioxid you have an alkaline medium and you get better results than with the hydrogen dioxid solution.

With regard to the electric treatment spoken of by Dr. Hofheinz, I have never had any experience with it in the treatment of root-canals. I was very much interested in the discussion that took place on this subject at the Fourth International Dental Congress, but I have never tried it. However, I think there certainly is some value in it.

The gentleman who spoke of using tricresol and formalin, after my outline of the treatment in the journals, is correct. You can seal it in teeth that you think will develop an abscess before morning and they will come back to you with all the soreness gone. I did not mention these little things in the paper, because they do not enter into a scientific paper very well. Sealed into a canal, with the canals thoroughly exposed, it will act upon these gases and liquids, converting them into liquids and solids which are antiseptics themselves. It is best to seal this in the pulp-chamber with cement, as it is very difficult to seal it with gutta-percha without causing pressure. I use a quick-setting cement, after filling most of the pulp-chamber with cotton. If you fail to get the remedy in contact with the putrescent material the patient will have the toothache, or, if you make pressure and force any of the ptomains or of the remedy through the end of the root, you may have to extract the tooth. To do this would be carelessness.

Dr. RHEIN. Suppose you have your tooth absolutely free from all organic tissue, I would like to get your opinion as to the result of washing that out with the solution that I spoke of—hydrogen dioxid and mercuric chlorid.

Dr. BUCKLEY. I do not mean to say anything against Dr. Rhein's method in any way. It is good in his hands, but he can do things that I cannot do. I can use the remedy which I suggested and chemically convert the putrescent material into non-toxic compounds without forcing any of the material through the end of the root; we can all do that. If he can do the same thing by the use of sodium and potassium—and I know he can—then it is an excellent thing to do. To subsequently wash out the canals with mercuric chlorid and hydrogen dioxid solution is a most excellent precaution, for I consider that a valuable solution.

(To be continued.)

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Devoted to the Interests of the Profession.

EDITED BY

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PHILADELPHIA, NOVEMBER 1905.

EDITORIAL DEPARTMENT.

"THE CHEMISTRY OF PULP-DECOMPOSITION WITH REFERENCE TO THE DISCOLORATION PROBLEM."

In the article by Dr. Buckley with the above title, in this issue, the author seems to be in doubt as to the rôle played by the elements sulfur and iron in the production of tooth-discoloration following devitalization and putrefaction of the dental pulp, and after asserting his disbelief in the possibility of the direct formation of ferrous sulfid under the conditions stated, offers a new hypothesis to account on a chemical basis for certain phases of tooth-discoloration: He says:

> As is well known, ammonia has the property of uniting chemically with water, which is always present in a putrescent root-canal, forming ammonium hydroxid, $NH_3+H_2O=NH_4OH$. This reagent will precipitate the soluble salts of iron in both the ferrous and ferric forms, producing respectively ferrous and ferric hydroxid, $Fe(OH)_2$, $Fe_2(OH)_6$. Now, it is not only possible, but quite probable, that the atomic iron which is liberated in the process of decomposition from the hemoglobin, or perhaps intermediate compounds containing it, unites with the ammonium hydroxid present, forming the hydroxid of this metal; and inasmuch as the compounds containing the iron are organic or weak, the ferrous hydroxid, in all probability, would be produced. Ferrous hydroxid is a white compound which readily absorbs oxygen when in the moist state and exposed to air, and gradually

changes to ferric hydroxid, a reddish-brown compound. In this change there is an array of four distinct colors—white, green, black, and brown—and in the blending of these four colors there is produced every variety of shades exhibited in the discolored teeth. Does not this explain in a plausible manner why teeth containing putrescent pulps change color when air is admitted?

We think it does. The Century Dictionary defines plausible as "Seemingly worthy of acceptance or approval; apparently right, meritorious, or worthy of confidence; having a specious or superficial appearance of truth or trustworthiness; as, a *plausible* excuse; a *plausible* theory or doctrine." Assuming that the ammonium hydroxid resulting from the putrefaction of the proteids of the pulp acted directly upon the organic salts of iron derived from the decomposition of hemoglobin, then, logically, ferrous hydroxid ought to be formed, and when formed in the moist state with exclusion of oxygen and then with air or oxygen subsequently admitted, the cycle of color changes specified by the essayist ought to follow as he states—indeed, they ought to follow almost instantly. But as we view it the major premises involved in this hypothesis are faulty. In the first place, it is not a clinical fact according to the writer's experience that a large percentage of cases of pulp-putrefaction are not accompanied by discoloration until after air has been admitted to the pulp-chamber; the admission of air is to be regarded as a coincidence and not a cause of discoloration, for nearly all or at least the very great majority of cases of pulp-death are the result of pulp-exposure and infection, and discoloration may or may not follow as a sequence. On the other hand, nearly all cases of discoloration are the result of hemolysis of the blood disks of the vascular supply of the pulp and the infiltration of the dentinal structure with the plasma holding the liberated hemoglobin in solution. Dr. Buckley is in agreement with the generally accepted belief that the principal source of tooth-discoloration is the iron ingredient of the hemoglobin, which being the case the hemoglobin or some of its derivatives must gain access to the dentinal structure as a necessary preliminary step in the process of discoloration. There are very many cases of pulp-decomposition in which no discoloration takes place, simply because infiltration of the dentinal structure by hemoglobin has not occurred. The opacity following pulp-death is not to be here confounded with discoloration or staining of the dentin, which latter is the condition under consideration.

Confining the discussion, then, to those cases which owe their discoloration to an original staining by infiltrated hemoglobin, Dr. Buckley agrees that the essential element concerned in the process of discoloration is the iron constituent of the hemoglobin, but he takes exception to the theory advanced by the writer in the "American Text-Book of Operative Dentistry," that the ultimate product of the progressive decomposition of hemoglobin is ferrous sulfid

or possibly some simple compound of this body with organic constituents closely approximating ferrous sulfid in composition. He offers as an alternative theory the suggestion that the progressive decomposition of hemoglobin results in the formation of ferrous hydroxid, which when produced in a moist state with exclusion of air is white, but which upon admission of oxygen quickly passes from white to green, then to black, and lastly to red or brown—changes attendant upon the conversion of the ferrous into ferric hydroxid; and because of this well-known property of ferrous hydroxid he concludes that the color-changes in a tooth with putrescent pulp following admission of air to the pulp-chamber are to be thus accounted for. He further contends against the validity of the theory of ferrous sulfid formation as a result of hemoglobin decomposition, on the ground that the hydrogen sulfid generated from proteid decomposition is an acid gas and will not, as is well known, form ferrous sulfid by direct action upon ferrous or ferric salts.

Certain facts well established and beyond the pale of theoretical reasoning are against the hypothesis brought forward by Dr. Buckley. First, the decomposition of hemoglobin by putrefactive processes does result in the formation of ferrous sulfid. This fact has been clearly established by the studies of Grohe and by Ziegler as stated in the "American Text-Book of Operative Dentistry," second edition, p. 538. It is unnecessary to bring forward as evidence the well-known fact that hydrogen sulfid will not precipitate iron as sulfid either from ferrous or ferric solutions. Nor has the present writer ever, so far as he is aware, asserted that hydrogen sulfid does combine directly with iron. In hemoglobin decomposition iron sulfid is formed because in the presence of ammonia the hydrogen sulfid is converted into ammonium sulfid, which is at once capable of forming ferrous sulfid, and a simple calculation of the percentage of the elements involved will show that in the putrefactive decomposition of hemoglobin more than enough ammonium sulfid is formed to completely precipitate all of the contained iron as sulfid.

But Dr. Buckley contends further that the formation of ferrous sulfid is insufficient to account for the variety of color changes through which certain teeth with putrefying pulps are observed to pass. It was not nor has it ever been the intention of the writer to convey that idea. Many other sources of discoloration in these cases are to be considered besides ferrous sulfid, and these will be presently referred to. It is, however, the intention of the writer to convey the idea that the final end-product of hemoglobin putrefactive decomposition is ferrous sulfid, and that this compound is that which gives to a tooth so affected its slaty gray or black tint which is the final stage of tooth-discoloration from hemoglobin staining.

As to the other sources of tooth-discoloration, they are many and varied, and occur long before the formation of Dr. Buckley's ferrous hydroxid could occur, even assuming for the purpose of argument that the formation of

ferrous hydroxid were chemically possible under the circumstances, which in our opinion it is not. The progressive splitting up of hemoglobin into simpler molecular combinations is accompanied by a well-marked series of color-changes due to the formation respectively of methemoglobin (brownish red), hemin (bluish black), hematin (dark brown or bluish black), and hematoidin (orange). As the decomposition proceeds and ammonium sulfid is formed we have the substitution of sulfur for oxygen in the methemoglobin molecule, forming sulfo-methemoglobin, a compound of dirty green color which Miller has suggested as one of the causes of superficial tooth-discoloration observed in certain cases of stomatitis.

We are unable to accept the theory of Dr. Buckley for two reasons: First, because neither chemically nor clinically does it appear to square with the facts in the case; and second, because tooth-discoloration from hemoglobin staining and its progressive decomposition can be more satisfactorily explained upon other grounds.

We are glad to note that Dr. Buckley has revised his views as to the reaction which takes place when sodium dioxid is added to water, and we are also glad to note his approval of the writer's method of bleaching by sodium dioxid, which was introduced to the profession by him in 1893,* and which has subsequently been pretty generally used with fair success. But in this connection we are constrained to inquire into the rationalism of preceding the bleaching operation with sodium dioxid by a treatment with a mixture of formaldehyd and tricresol. What desirable therapeutic end can be attained by the formol-tricresol combination that cannot also be attained as well by the sodium dioxid? Why use both when the latter must be used under the circumstances anyhow, and is sufficiently antiseptic and germicidal to effect complete sterilization? Why first destroy the germ and its waste products with a cannon and then destroy them some more with a Gatling gun?

"F. D. I."

International Dental Federation: Next Meeting.

THE next meeting of the Executive Council of the International Dental Federation will be held at Geneva, Switzerland, August 8 and 9, 1906, immediately following the meeting of the Central Verein Deutscher Zahnärzte, to be held in Berlin, Germany.

EDWARD C. KIRK,
Secretary-General of the F. D. I.

*DENTAL COSMOS, February 1893, page 162, and March 1893, page 192.

BIBLIOGRAPHICAL.

MANUAL OF CHEMISTRY. A GUIDE TO LECTURES AND LABORATORY WORK FOR BEGINNERS IN CHEMISTRY; A TEXT-BOOK SPECIALLY ADAPTED FOR STUDENTS OF MEDICINE, PHARMACY, AND DENTISTRY. By W. SIMON, PH.D., M.D., Professor of Chemistry in the College of Physicians and Surgeons of Baltimore, and in the Baltimore College of Dental Surgery, etc. Eighth Edition, thoroughly revised. With 66 illustrations, 1 colored spectra plate, and 8 colored plates representing 64 chemical reactions. Philadelphia and New York: Lea Brothers & Co., 1905.

We have favorably noticed this standard work as the editions have successively made their appearance. It is a book for students by a teacher who in his particular field fully measures up to the requirements of that designation. The ground covered is no more than ought to be well traversed by every student of medicine, pharmacy, or dentistry whose knowledge of chemistry is intended to be part of his working professional equipment and not a mere pretense. The subject is necessarily presented in condensed form, but with a clearness and avoidance of verbiage that goes to the heart of things and reaches the easy understanding of the average man. A careful examination of the work, which has been fully revised up to the present state of chemical knowledge, suggests the thought that no one thing or influence could contribute more to the solid advancement of the dental profession than that each of its members should make the contents of this book a part of his intellectual equipment, and attain the same facility in the use of its contained information as he makes of his knowledge of technical dentistry. We are of the opinion that the crying need of dentistry today is a better and more thorough training in the data and science of chemistry. Simon's book is a means to that end.

BOOKS AND PAMPHLETS RECEIVED.

La Anestesia Local en Odontología: La Estovaina. By Jaime D. Losada. Madrid, 1905.

Index der Zahnärztlichen Literatur und Zahnärztliche Bibliographie. By Professor Dr. Port. Heidelberg: Verlagsanstalt und Druckerei, Hörning & Berkenbusch, 1905.

Manual of Operative Surgery. By John Fairbairn Binnie, A.M., C.M. (Aberdeen), Professor of Surgery, Kansas State University, Kansas City, Fellow of the American Surgical Association, etc. Second Edition, revised and enlarged. With 567 illustrations, a number of which are printed in colors. Philadelphia: P. Blakiston's Son & Co., 1905.

Manuel de Thérapeutique Dentaire (Odontotherapie). Par Ch. L. Quincerot. Paris: Vigot Frères, 1905.

REVIEW OF CURRENT DENTAL LITERATURE.

Conducted by JULIO ENDELMAN, D.D.S.

[*l'Odontologie*, Paris, September 15, 1905.]

HYDROGEN DIOXID: PREPARATION OF ALKALINE SPECIMENS BY MEANS OF SODIUM PERBORATE. By V. E. Miége-ville, Pharmacien de première classe, etc.

The author states that the preparations of H_2O_2 usually employed in surgical and medical practice possess the disadvantage of being acid in reaction, owing to the fact that acids are added to the solutions in order to counteract their instability. As obtained directly from the laboratory the H_2O_2 preparations are easily decomposed, especially when exposed to the light and to a humid atmosphere. To render them more stable it has been recommended to add to 1000 grams of hydrogen dioxid of 12 volumes per cent. 30 grams of boric acid. The resulting solution is perfectly clear and almost tasteless, and when in contact with organic matter easily parts with the extra atoms of oxygen.

The compound which constitutes the principal object of this communication is the sodium perborate. Perborates are peroxygenated acid salts, differing from boric acid in that they contain one more atom of oxygen. Sodium perborate is prepared by thoroughly mixing together 78 grams of sodium dioxid and 248 grams of crystallized boric acid, which is then added gradually to two liters of cold water, stirring the mixture until completely dissolved, when it is filtered and put to one side. The reaction takes place spontaneously, there being noticed shortly afterward the deposition at the bottom of the vessel of a white crystalline powder—the sodium perborate, which, according to Etard, corresponds to the formula $B_4O_8Na_2+10\ H_2O$. It may be preserved indefinitely even when exposed to the air or when kept in unstopped bottles. One kilogram of sodium perborate contains 104 grams (or about 80 liters) of active oxygen, which becomes available upon mixing the compound with distilled water. The H_2O solution thus prepared is of alkaline reaction and perfectly stable. As may be easily appreciated, sodium perborate offers to the practitioner advantages of the highest order. With it—and almost instantaneously—chemically pure solutions can be prepared. One liter of water at the temperature of 15° C. will produce upon the addition of 25 grams of sodium perborate an H_2O_2 solution containing twice its volume of oxygen. By raising the temperature of the water the solubility of the compound is increased, it being thereby possible to obtain solutions containing three, four, and five times their volume in oxygen.

The temperature of the water, however, should not be raised above 40° C., as at this point or above it the solution loses part of its oxygen. The solubility of the perborate is greatly enhanced by the addition to the water of such a weak acid as citric or tartaric. By this means solutions of 10 to 20 volumes are obtained. The following are some of the formulas suggested by the author:

H_2O_2 giving 2 volumes of available oxygen.

Sodium perborate, gm. 25;
Boiled water (cold), liter 1.

H_2O_2 giving from 10 to 20 volumes of available oxygen.

Sodium perborate, gm. 170;
Pulverized citric acid, gm. 60;
Boiled water (cold), liter 1.

H_2O_2 giving from 18 to 20 volumes of available oxygen.

Sodium perborate, gm. 210;
Pulverized citric acid, gm. 105;
Boiled water (cold), gm. 700.

In dentistry, sodium perborate may be employed in solution yielding H_2O_2 and oxygen or in powdered form, as when in contact with

the tissues, inflamed or normal, a sufficient amount of humidity is always present to cause the evolution of oxygen.

[*Schweizerische Vierteljahrsschrift für Zahnheilkunde*, Zurich, September 1905.]

THE THERAPEUTICS OF BLUE LIGHT.

By Professor Dr. Redard.

The author refers to the influence of various kinds of light upon inorganic, vegetable, and animal matter. He points out the well-known fact that in the inorganic world substances are affected by the light, as witnessed in chemical laboratories, where reactions take place in different ways according to the character of the surrounding atmosphere. Substances undergoing crystallization are likewise affected by the prevailing light. In the vegetable kingdom it has been repeatedly observed that the color of plants varies according to whether they grow in sunny or shady places, in flat or mountainous regions, and under the influence of white or colored light.

Regarding the effect of light upon man, it has been found that it has a marked influence upon our tastes, habits, temperament, etc. People of warm countries are as a rule vivacious, optimistic, and have a preference for the bright colors, while those of northern countries are inclined to be melancholic and prefer the darker colors, deep yellow, black, etc. The influence of the light is shown in the color and nature of the costumes prevailing in different countries. Sunlight is composed of three kinds of rays, *i.e.* caloric, luminous, and chemical. Contrary to the opinion prevailing in olden times to the effect that only the caloric rays play a part in the maintenance of animal existence, we know at present that the chemical rays are equally as important. Physiological experiments upon plants have revealed some rather significant facts. For instance, it has been shown that the yellow rays confer upon the chlorophyll of plants the property of decomposing the carbonic acid gas, while the violet rays influence assimilation. Flammarion has shown that red light influences the growth of vegetables to a marked degree, and Finsen that the blue and violet rays induce in the lower organisms certain movements by their action upon the nervous system. On the other hand, the ultra-violet rays destroy the chlorophyll as well as a great number of microbes which have resisted the influence of chemical agents. Professor Redard has carried out a series of interesting investigations concerning the effects of certain colors upon man, and records the interesting conclusions that while red may induce agitation, excitement, and a degree of unpleasant nervousness, and yellow, melancholia and sadness, blue induces quietness and a certain degree of *bien-être*. These experiments were further pursued and led to the discovery that blue light, apart from exercising a decidedly sedative influence, produced marked analgesia of the trifacial, permitting of the painless performance of short operations in the tissues supplied by it and in particular the teeth. The numerous successful operations performed by Dr. Redard under blue-light analgesia absolutely confirm his previous investigations. The essayist does not attempt to explain the physiology of the blue rays, as all the theories thus far advanced are by no means of a nature to clearly explain the several phenomena to which the blue rays doubtless give rise.

The technique is simple, and consists in placing the patient facing an ordinary incandescent lamp, the glass part of which is either blue, violet or green. To the lamp a reflector is attached. It is necessary that the patient should keep the eyes wide open. The distance between patient and light should be about six inches. The patient's head and the light should be inclosed by a blue veil, in order to prevent the surrounding diffuse rays. Inside of three minutes insensibility is complete, but lasts a short while only, sufficient, however, to permit of the extraction of a tooth absolutely painlessly.

[*Journal des Praticiens*, April 22, 1905.]

CRACKED TONGUE.

This deformity of the tongue is of dystrophic nature, and is usually associated with other manifestations of early malnutrition, especially of the type affecting the dental organs. It has been designated under the names of scrotal, fissured, cerebriform tongue, fleischzunge, faltenzunge, etc. It is not a painful deformity, although it seems to slightly interfere with phonation, and in certain cases leads to a state of hyperesthesia of the organ. The tongue appears enlarged, reddish, devoid of its natural humidity, is often covered by a saburral deposit, and the papillæ

are hypertrophied. The dorsal surface is divided into segments by deep intersecting grooves. The median groove is the deepest, the transverse ones leading from it toward the margins of the organ—the *ensemble* having a leaf-like appearance. The fissured condition often predisposes to acute inflammatory phenomena, especially in the presence of ragged edges of teeth. Leucoplakia and marginal exfoliative glossitis develop easily upon the fissured tongue, which is also an extremely predisposing factor to the tertiary syphilitic manifestations. The pathology of cracked tongue is obscure. It has been attributed to the arthritic state and to hereditary syphilis. The clinician should guard against confounding this disturbance with syphilis, as in such a case of mistaken diagnosis the specific treatment would induce stomatitis, glossitis, and ulcerations. The treatment should consist in instituting thorough hygienic measures, prohibiting entirely even the most moderate use of alcohol and tobacco.

[*International Dental Journal*, October 1905.]

SOME PARTIAL IMPRESSIONS. By Dr. S. E. Davenport, New York.

The advantages possessed by modeling composition over plaster in some cases are well understood and appreciated by most practitioners, and, in spite of a rather general feeling to the contrary, the successful handling of composition requires quite as much skill as does plaster.

Among the disadvantages of plaster as an impression material mention may be made of its lack of firmness and consequent failure to press the soft parts into the position they would naturally occupy under a plate. The greater one's experience with modeling composition, the more positive is the opinion, I think, that the best results are to be obtained when the least thickness possible of the softened material is used. This means one of two things: either the tray must conform very closely to the mouth or a preliminary impression of composition must be taken, and, after being chilled out of the mouth, cut away slightly over the whole surface for the addition of a thin layer of soft composition for the final accurate impression, the hard composition underneath serving merely as an addition to the tray to force the soft composition into all inequalities. While plaster is a more reliable material for impressions of hard upper jaws, when the plate decided upon is to depend for its retention upon atmospheric pressure, the very soft upper gums occasionally met with may be more accurately duplicated by the skilful use of modeling composition, and the resultant "suction" will therefore be greater. For a number of years the author has employed composition almost entirely for the taking of difficult impressions for lower partial plates, the method being the same whether the plate is to be of gold, rubber, or other material.

A composition impression is first taken in a tray which conforms as closely to the desired parts as will any ready-made tray. This composition impression is then poured with plaster as usual, and the resultant model is used for the making of a special tray which will quite accurately fit the parts to be duplicated.

A die and counter die having been made from the plaster model of the preliminary impression, copper plate No. 28 is swaged, then thickened and stiffened by the addition of pure tin flowed over the reverse side with a soldering iron. A wire handle is then soldered on.

Before taking the final impression, the new impression tray which already fits the first model, should be carefully adjusted to the mouth so that it will easily go to place by the use of a certain practical movement, and if the design is carried out the tray will fit the gum and necks of the teeth so accurately that but a thin layer of composition will be necessary.

In taking the impression the tray and composition should be carried to place with considerable force, which should be as evenly distributed over the whole surface as is possible. No effort should be made at this time to secure an accurate impression of the crowns of the teeth, it being unnecessary to have them represented at this stage of the process, whether the plate is to be of gold or rubber.

If gold is to be used, the plaster teeth would be cut from the model before it is molded in the sand; if the plate is to be of rubber, the better way in these difficult cases is to vulcanize the plate upon the model first, using it then for taking the bite, as one would in the case of a wax form or a gold plate.

Dr. Davenport says: In a recent case I was asked to make a complicated lower partial plate to take the place of a poorly fitting rubber plate which the patient had vainly attempted for two or three years to get good use from. As I was about to take the preliminary impression to have the special tray made, the thought came to me that I might use the old plate for the tray. Then adding a thin layer of composition to its under surface, I carried it to the proper position, and the plate made upon that model fitted like the proverbial "duck's foot in the mud."

Emphasis should again be given to what in my use of composition has been an established fact: The greatest accuracy of result is obtained with the thinnest possible quantity of the softened material carried to its place in a positive and forceful manner.

[*La Revue de Stomatologie*, Paris, May 1905.]

NECROGENOUS SYPHILITIC CHANCRE OF THE UPPER LIP. REMOVAL OF MAXILLARY SEQUESTRUM.

By Dr. Henri Rodier, Dentist To the Hospitals.

A young woman having sought the services of a dentist for the treatment of caries in the upper incisors, suffered in the course of the operation from a slight laceration of the frenum of the lip accidentally inflicted by the dentist. About two months afterward a slight ulcer developed upon the gum near to where the laceration had occurred. The patient consulted a dentist, who hastily diagnosed the trouble as aphthæ and painted it with tincture of iodin, instructing the patient to repeat the application every day. Conditions became gradually worse, and upon one occasion while applying the iodin a piece of grayish mucous tissue was removed, exposing the underlying bone. It was here that Dr. Rodier was called in by the patient's family physician to confirm the diagnosis he had reached, *i.e.* syphilitic infection. Dr. Rodier found the mouth in a lamentable condition. The gums were intensely red and highly tumefied, decayed roots and teeth were everywhere present, and large calculi had accumulated upon the surfaces of the crowns and roots. The ulcers under the lip were of about the size of a ten-cent piece, had perfectly round margins, indurated, and of a pink color, and rested apparently upon a very hard cartilaginous bed. One of the ulcers was located upon the frenum and immediately adjacent tissues, and the other upon the gum under the frenum, exposing the semi-necrosed alveoli of the now loosened central incisors. An explorer introduced between the ulcers could be made to pass into the floor of the nose. A ganglionic induration could be detected upon the floor of the mouth. This was of the indolent, non-inflammatory type. This pathognomonic sign confirmed the cause of the violent nocturnal headaches and rose-colored spots upon the chest, arms, and forearms. All the above symptoms eliminated the possibility of error in the original diagnosis. The nature of the disease having been positively established, the patient was treated by her physicians with hypodermic injections of mercury benzoate. Several months afterward the lip and gum lesions were on the fair road to recovery, and the sequestrum having become circumscribed was removed by Dr. Rodier. It comprised the upper centrals, the lateral incisors, and a good portion of the alveoli of those teeth and of the maxilla. While all the circumstances of the case point to an infection by the dentist, yet it could not be positively affirmed, as the young woman's husband had suffered from a syphilitic attack ten years previous.

[*Deutsche Monatsschrift für Zahnheilkunde, Leipzig*, August 1905.]

ANESTHESIA IN ORAL OPERATIONS.

By F. Honigmann, M.D.

Regarding the use of general anesthetics the author says that chloroform must be struck from the list of those suitable for dental operations. It has the highest mortality (1 in 2000 in general operations, and 1 in 14,000 in dental operations). The interval between the narcotic and lethal dose is so slight that the former quickly passes into the latter. Besides, sudden attacks of syncope are to be feared at the beginning of the anesthesia, probably brought about through laryngeal, nasal, or pharyngeal reflexes. The advantages of chloroform are, moreover, of weight only in operations requiring prolonged anesthesia. Ether properly administered is less dangerous than chloroform. Not only is the number of deaths smaller, but dangerous

accidents are also much less frequent—eight times less according to the statistics of the British Medical Association. The interval between the anesthetic and lethal dose is decidedly larger with ether. It has no ill effects upon the heart and blood pressure, and the unfavorable action upon the mucous membranes of the respiratory organs seems to occur only when the highly concentrated vapor is administered, as was the case with the older method of etherization. A method introduced by Witzel and Hoffman is applicable for the production of prolonged and deep anesthesia, especially when preceded by a preliminary injection of morphin, and is not followed by unpleasant after-effects. Still, ether anesthesia has one drawback which is even emphasized where only a short anesthesia is desirable. The time required to induce anesthesia is decidedly longer than with chloroform. Some writers put this at from ten to fifteen minutes on the average, but it is often necessary to wait even half an hour and longer. This disadvantage may be obviated in the case of operations requiring but a short time by operating during the analgesic state which occurs in the first period of the inhalation, before the period of excitement sets in. From 30 to 50 cm. are poured upon the inhaler or napkin; the patient is asked to take several long breaths before beginning the inhalation, and to inhale the ether by deep breaths.

Ethyl bromid must be considered as being more dangerous because of its higher mortality (1 death in 5228 in general operations and 1 in 31,000 in dental practice). Some observers have ascribed the fatal accidents that have been recorded to the employment of impure preparations. Vomiting has been observed in about 2 per cent. of cases, this after-effect being especially likely to occur after the extraction of teeth. The period of excitement may be prevented by a preliminary injection of morphin. The drop method is to be preferred, as with it the reflexes persist and narcosis and recovery are rapid. The maximum dose is said to be 25 grams. If the anesthesia be not extended beyond five minutes, it is held that there is no danger. The preparation should be tested for purity (odor and color) before the administration.

Ethyl chlorid has lately been introduced as a competitor of the bromid. The advantages claimed for it are rapid narcosis (1 to 1¼ minutes), absence of much excitement, rapid recovery, pleasant administration without irritation of the mucous membrane, and absence of unpleasant effects. Vomiting has been observed in 50 per cent. of cases.

Last, but not least, we have to consider hyponitrous oxid. This the oldest of all known anesthetics is the least dangerous. Series of 46,000, 69,000, and 144,000 have been reported by different practitioners without complications. Anesthesia begins after 40 to 60 seconds; stertorous breathing and cyanosis occur only after prolonged anesthesia, many authors maintaining that this can be avoided by combining oxygen with the gas. Dyspneal conditions, struma, disturbances of compensatory cardiac conditions, etc., are contra-indications to "laughing gas."

Whatever the anesthetic employed, certain precautionary measures must be observed in every case. A careful examination, not only of the heart and lungs, but also of the urine and the nervous system, should precede the administration of the anesthetic. The patient should be in a horizontal position and free from all tight clothing. The pulse and respiration should be continuously watched. The entrance of blood into the air-passages should be prevented by the usual means, and after the operation is concluded the patient should rest for some time in a well-aired room.

The most effective measure, however against the dangers of narcosis consists in limiting its induction to a minimum. Happily this is now possible without violence to humanitarian considerations through the extraordinary development of the methods of local anesthesia. The combined use of cocain with preparations derived from the suprarenal bodies has inaugurated a new era for the painless performance of dental operations. To H. Braun belongs the credit of showing that by the addition of adrenalin the effect of a weak solution of cocain is so greatly increased that its anesthetic effect becomes equal to or greater than strong solutions of cocain without such addition. The cocain because of the absorption-checking action of the adrenalin, being almost entirely localized at the spot of application, has a more intense and uniform effect, and is perhaps also less toxic. Many observers who have tried the new plan are agreed that it surpasses all pre-

vious methods of local anesthesia in effect and reliability. The cocain-adrenalin injections have been employed for terminal as well as conductive anesthesia. The method of inhibiting the conducting power of the nerve trunk has been found superior to subgingival injections, particularly in the case of the lower molars. Hubner recommends limiting the same to the upper and lower molars and second bicuspids as well as the lower first bicuspids; in the case of the other teeth local subgingival injections are sufficient. Both methods may be combined for the extraction of pulpitic teeth, in periosteal interventions, cyst operations, opening of the antrum, and in the treatment of root abscesses. A less quantity of fluid is then required for local injection. The slight danger of the entire quantity of the injected fluid entering a vein and so causing toxic symptoms may be avoided by bearing in mind Reclus' rule of continuously advancing the syringe while injecting the solution into the tissues.

The favorable results of cocain-adrenalin anesthesia have led to its use also in the conservative treatment of the teeth to lower the sensitivity of the dentin.

Although the addition of the adrenalin inhibits the absorption of the cocain, it is well never to exceed 2 cg. in oral operations. The author indorses the dose suggested by Braun of 5 drops of the 1 per cent. solution as the maximum.

Witzel has raised the question whether in dentinal anesthesia the pulp is able to overcome without injury the disturbance in the circulation induced by the adrenalin, or whether its vitality is impaired thereby. This question has not yet been settled. Until this and similar ones have been definitely answered, it is certainly advisable to limit the employment of the adrenalin-cocain method in anesthetizing the dentin to such cases where an entirely harmless procedure, such as ethyl-chlorid spray, would not fulfill the purpose.

[*International Dental Journal*, October 1905.]

SOME EFFECTS OF INEBRIETY ON THE TEETH AND JAWS. By Dr. T. D. Crothers.

The author studies the effects of excessive use of alcohol and inebriating drugs, and summarizes his observations in the following conclusions: First, spirit and drug taking is a very potent cause of defective teeth and gums, it may be stated that a large percentage of degenerations of the mouth come directly or indirectly from this source. Second, conditions of degeneration which localize in the teeth and gums may be exciting causes of spirit and drug taking. The increasing prevalence and demand for narcotic drugs indicates low vitality, of which the vigor of the teeth is a prominent part. A study and correction of the injuries or beginnings of diseases in the mouth may effect the removal and prevention of serious drug neuroses which may follow.

[*Société Française de Dermatologie et de Syphiligraphie*, July 15, 1905.]

RADIO-THERAPY IN THE TREATMENT OF EPITHELIOMA OF THE TONGUE. By Dr. Pautrier.

The author reports absolutely negative results in the treatment of two cases of lingual epithelioma by the X ray. These cases were apparently particularly adapted to treatment by this means and were not of a severe nature, as there was practically no ganglionic involvement, and of the tumors the one upon the tip of the organ was of diminutive size. Not only did the treatment prove a failure in eradicating the growths, but it was powerless to prevent the development of a third tumor in the course of the X ray applications.

[*La Revue de Stomatologie*, Paris, May 1905.]

A DENTURE ACCIDENTALLY SWALLOWED LODGING IN THE ESOPHAGUS: REMOVAL BY EXTERNAL CERVICAL ESOPHAGOTOMY. By A. Hannecart, Brussels, Belgium.

The author reports the case of a man who during an epileptic attack swallowed an upper vulcanite denture of six teeth. After the attack the patient vomited violently, and in so doing loosened the plate. A careful search revealed but a fragment of the vulcanite attachment, which fact, together with a certain uneasiness in the throat, led to a diagnosis of accidental swallowing and lodging of the plate in the esophagus. The esophagus was explored with a De Graefe sound, but as it was not found in any way obstructed, the

original diagnosis was rejected. The uneasiness, however, persisted and in addition the patient suffered from severe pain at the base of the neck. It was on account of the persistence of the latter symptom that Dr. Hannecart was consulted. He obtained a radiogram which showed conclusively that the original diagnosis was the correct one. Owing to the location of the plate it was found necessary to perform an esophagotomy, when the foreign body was easily removed.

This report is interesting for two reasons. First, because the esophageal exploration as in several other published instances, gave negative results, and, secondly, because notwithstanding the bulk of the plate it remained in the esophagus for about ten days without interfering with the respiratory functions, although it caused a peri-esophageal abscess and a sphacelous condition of the esophageal wall.

[*La Revue Stomatologie*, Paris, May 1905.]

BUCCAL LEUCOPLAKIA. By Dr. G. Filaretopoulo, of the University of Athens, Greece.

Leucoplakia is not a definite morbid entity. Under this name are designated several pathological states of the mucous membrane characterized clinically by the appearance of white plaques upon the mucous membrane. The most frequent cause, when localized in the mouth, is syphilis of old standing. In such cases the excessive use of tobacco is perhaps the only exciting cause, although it must be stated that tobacco alone may bring about the disorder. When tobacco is the only cause the plaques are located upon the commissures of the lips and upon the cheeks. When the cause can be attributed to syphilis the plaques are almost always situated upon the tongue. Lingual leucoplakia purely of tobacco origin is very rare. After syphilis it is principally the herpetic state which induces the development of the white plaques. Herpetism is, of course, characterized by an intense degree of irritability of the skin and mucous membrane greatly predisposing them to inflammatory phenomena and eventually leading to epithelial sclerosis. In herpetic constitutions these buccal alterations are usually induced by chronic dyspepsia. The tongue is red, congested, becomes fissured, and small, usually very painful ulcerations develop, principally upon the margin of the organ. White striæ are soon afterward observable and the whole organ assumes the characteristic leucoplakial appearance. In syphilitics and dyspeptic herpetics, besides by tobacco the disease may be brought about by the excessive use of alcohol, spices and by the presence of ragged edges of teeth. Leucoplakia is a disease affecting almost exclusively the male, which fact plainly shows that tobacco is indeed a factor of considerable importance in its production. The clinical aspect of the disease varies markedly. The principal symptom consists in the transformation of the epithelium of the mucous membrane into epidermic tissue —that is, into keratinized cells which eventually cause a sclerotic thickening of the dermis of the membrane. This thickening is accountable for the fundamental symptom— the hard consistence of the plaques and adjacent areas. It is due to this induration of the plaques that the name leucokeratosis has also been given to the disease by several writers and authors.

The disturbance in the beginning is not accompanied by pain. It appears at first in the form of red spots which later become united and change into the whitish plaques. These plaques may be treated and entirely eradicated at the beginning of the attack, but if the irritation continues the mucous membrane around the plaques becomes thick and fissured, the plaques lose their primitive form, cease to be smooth, and become ulcerated, eroded, and papillomatous. The plaques are at times small, very close together, separated by very narrow grooves, giving to the tongue the appearance of a network; at others they are long, flat, and give to the organ a decidedly mosaic appearance. Their form also varies; they may be round and nummular, oval, or elongated. The plaques are usually upon the dorsum and margin of the tongue. The margin of the organ appears eroded and fissured, especially upon those points against which pressure is exerted by the teeth. Their location in order of frequency is as follows: tongue, labial commissures, lips, gums, and soft palate.

At the onset of the attack no subjective symptom is present. Later on, however, dryness of the mouth, difficulty in mastication, and occasionally salivation are some of the prevailing signs. The plaques when neg-

lected, especially those upon the margin of the tongue, may become inflamed and will suppurate, acquiring the characteristics of true ulcerations.

It is today a well-known fact that leucoplakia is often a forerunner of epithelioma, especially so when the disturbance is due to a syphilitic attack of old standing. This is a significant fact inasmuch as syphilis *per se* plays an active rôle in the production of epitheliomatous neoplasms of the mucous membranes by reason of its causing a marked degree of diminished vitality throughout the tissues of the body.

Leucoplakia is a disturbance difficult to diagnose, and in order that the practitioner be reasonably justified in reaching the leucoplakia diagnosis it becomes *ipso facto* an imperative necessity to exclude by careful and thorough diagnosis all other diseases which simulate leucoplakia—namely, the ordinary buccal eczema, syphilitic gummata, the ordinary lichen, lingual psoriasis, and lingual tuberculosis.

Concerning the treatment of this malady the author advocates the use of potassium iodid in moderate doses, even in those cases in which all syphilitic connection has been eliminated. If the leucoplakia should be of arthritic origin the diet should be the same as for cases of ordinary gout and should include the alkaline mineral waters. The use of tobacco should be entirely suppressed, also spiritous liquors and wines. Very hot or very cold food and drinks should be avoided. Particular attention should be given to the hygiene of the mouth. The teeth should be brushed after each meal. Care should be exercised that no débris remain between the teeth. Astringent mouth-washes should be avoided, the only ones recommended by the author being those of decidedly alkaline properties. Antiseptic pulverizations twice daily of about ten minutes each are sometimes very useful, provided the solutions are well diluted. A weak solution of boric acid, sodium salicylate, or sodium bicarbonate are recommended.

When the dryness of the mouth and induration of the plaques are very intense the affected parts may be favorably treated with applications of iodol in lanolin 1 : 40 or boric acid in balsam of Peru. The deep grooves and ulcers apart from the treatment above described may be cauterized with acid nitrate of mercury and with silver chromate in the nascent state. This is accomplished by touching the plaques with a 10 per cent. solution of chromic acid, and immediately after with a mitigated silver nitrate stick. The author does not favor the employment of lactic acid, tincture of iodin, or concentrated silver nitrate solutions, all strong irritants favoring epitheliomatous transformation.

Surgical treatment is indicated in the case of the hard, rough, and thick plaques, these being seldom affected by topical applications. In the presence of a plaque surrounded by papillomatous tissue the surgeon should not hesitate to operate at once. The thermocautery or the galvano-cautery act better than the bistoury or the sharp curette. Not only the diseased tissue but also part of the healthy surrounding tissue should be removed. In depth the incision should go beyond the indurated area.

PERISCOPE.

Shading Porcélain with Cement.—To ascertain the effect a certain color of cement will produce on an inlay, mix the powder with water, place it in the cavity and force the inlay to place over it. This gives the same effect in appearance as mixing with phosphoric acid. In this way a test may be made before the actual setting, and the correct shade of cement powder selected.—F. E. CHEESEMAN, *American Dental Journal.*

New Method of Attaching Teeth to Plate.—A method which proved successful in a case where teeth had been repeatedly broken from the plate is as follows: Use long-pin plate teeth for six anterior teeth, back and edge as for bridge, articulate and solder together, then solder platinum wire back of teeth for anchorage to rubber base, proceeding from this point as usual with rubber plate.—C. A. BENT, *American Dental Journal.*

A Hint on Mixing Cement.—For properly mixing cement a strong, pliable, rather long-bladed spatula (I use hickory) gives the best results. It should be used rapidly with long, strong strokes, exerting considerable downward pressure, thus compelling a thorough mechanical mixing, which is the only way to create the opportunity for an accurate chemical union, which is very necessary if the maximum density and adhesiveness is to be attained.—C. N. THOMPSON, *American Dental Journal.*

The Step Anchorage and Its Indications.—We are seldom if ever justified in placing a filling in the approximal surface of a bicuspid or molar where the occluding tooth is in position and the occlusion is normal, without securing it by a step anchorage cut at a right angle to the pulpal wall into the occlusal fissure. If this is done, and the step is cut sufficiently broad and deep, making that portion slightly broader at the end farthest from the cavity, there will seldom be any movement of the filling in the cavity, but care must be exercised in preparing the step to make it sufficiently deep and broad to insure sufficient filling material to prevent its stretching or breaking by the force of occlusion in the course of mastication.—J. F. WALLACE, *Dental Era.*

Porcelain Inlays: Percentage of Failures Not Greater than with Metallic Fillings.—After more than ten years' continuous experience with the porcelain inlay, it is the opinion of the writer that it is impossible to carry on an honest up-to-date practice without employing it, and an examination of records showing many hundreds of these fillings develops the fact that the percentage of failures is no more than in metal fillings, and particularly in large cavities. I would say, however, that as soon as its marginal weakness reveals a possible avenue for failures when exposed to masticating forces I withdraw, and use gold inlays on occluding surfaces instead. Therefore the percentage of failures mentioned would probably be lessened.—C. N. THOMPSON, *American Dental Journal.*

Cavity Formation to Facilitate Burnishing the Matrix.—The tendency of the platinum foil to dodge or slip when burnishing it to the cavity is so dependent upon the deep formations that it should not be overlooked. Every cavity, however simple, should be prepared in such a way that there will be a definite angle or depression at the bottom, to be used as a locating point to prevent subsequent movement. Retentive formations favor burnishing, because as soon as one point is down it is possible to securely hold it until others are similarly fitted, when it will be inclined to stay without holding it, so that it can be swaged to its place, using cotton or gum-camphor, gutta-percha, etc., ahead of a drift of wood.—C. N. THOMPSON, *American Dental Journal.*

Retention.—While we all know that cement has certain adhesive properties and that many advocate relying upon it entirely for retaining inlays, there can be no objection when forming cavities to keep in mind the possibilities of retentive formation with the idea of creating an interlocking condition to make the filling more secure, and one that will compel the placement of the filling from one

direction, and that on a line with masticatory strains, thus depending upon the cement only as a key to lock the filling in. The details of this part of the subject have been discussed in the journals so recently that we will pass them by saying that the body of the filling and not extremities should be selected for retentive projections, and that the more securely the filling is interlocked within the cavity the greater the certainty of securely seating it while cementing it to place.—C. N. THOMPSON, *American Dental Journal.*

Reasons why Cavities should have Straight Lingual, Buccal, and Gingival Margins.—The lingual, buccal, and gingival margins of a cavity in the approximal surface should always be extended to where they are accessible to the usual means of cleanliness. The linguo-gingival and the bucco-gingival angles are points that probably are more often neglected in the cavity preparation than any other, especially by those who are trying to practice "extension for prevention." The usual form of a cavity being circular, these angles are very often allowed to curve somewhat instead of carrying them on a parallel line with the long axis of the tooth. This leaves an area of tooth-structure at these angles that is especially susceptible to decay; while if the buccal and lingual margin was made parallel with the long axis of the tooth that portion most susceptible to decay would be covered by the filling, and the danger of recurrence of decay very largely removed.—J. F. WALLACE, *Dental Era.*

The Unequalled Record of Hyponitrous Oxid.—A comparison of the safety of hyponitrous oxid with other anesthetics viewed from merely the number of administrations is very unfair to the former. When one considers that the other general anesthetics best known and generally used are employed by men who have had good training and instruction in their use, and that gas is given by men indiscriminately the large majority of whom never administered it under a preceptor, and that it is given hundreds of times by these same inexperienced men to patients who were forbidden any anesthetic by men well qualified to judge of their physical condition, then any such comparison is unfair to gas. The successful results from the use of gas in the hands of so many untrained and incompetent persons is one of its strongest points as an advantage in its use, because it is an almost absolute guarantee of its safety.—S. STRAITH, *Dental Register*

Hand Sterilization by Oil of Cloves.—Rosnow made experiments in connection with hand sterilization, making cultures (1) before scrubbing, (2) after thorough scrubbing, (3) after both scrubbing and the use of an antiseptic. This was done with (1) the oil of cloves method, (2) the creolin method, (3) the bichlorid method. The cultures were made by scraping epithelium from the skin of the hands and under the nails, and inoculating upon the surface of agar. The results showed great diminution in the number of the bacteria after the use of the scrubbing brush, and still greater after the use of the antiseptics. They also showed (1) that the skin ordinarily harbors many bacteria, (2) that thorough scrubbing with green soap and brush removes many bacteria, but not all, (3) that antiseptics destroy or dispose of a still larger number, and of the antiseptics tested clove oil seemed the most efficient. While it does not destroy all the bacteria in so short a time as other antiseptics, its volatile and penetrating qualities enable it to reach where the others cannot, and so to destroy the bacteria.—*New York Medical Journal.*

Bad Teeth and Appendicitis.—"The organisms found in a septic tooth are also found in the appendix, and there is good reason to believe that neglected teeth are largely responsible for the increase of appendicitis."

This is Professor Symes-Thompson's opinion, expressed in a recent lecture at Gresham College on "The Teeth in Disease." In support of it he explained that civilization had led to cookery and the living on prepared and soft foods in the place of nuts and roots. Consequently, people had lost their masticating power; but there were good reasons for thinking that the wider spread of the knowledge of the laws of health had more than counteracted the tendency toward a race of toothless men. Professor Symes-Thompson urged the practice of washing the teeth after meals and rubbing them twice a day, especially the last thing at night. He had not been able to discover that bacteria had any particular objection to nicotine, but smokers were often more careful about cleaning their teeth. Because of that, smoking might be commended. Dr. Greenwood, the medical officer of health for Blackburn, advocates tooth-brush drill for the children in the town schools. He points out that bad teeth are responsible for many maladies, and that there is no reason why tooth-brushes should not be included in the school outfit as well as dumb-bells and other gymnastic appliances.

Condense Gold from Center Toward Margins.—In condensing gold we should always condense from the center to the cavity wall. If we begin the condensation next to the cavity wall and work toward the center the tendency will be to draw the gold from the cavity wall, where it is already hardened under the force of the mallet blows. If we lay a piece of iron on the anvil and strike it in the center we see the ends turn up at once from the contraction of the molecules of iron due to the blow, but we continue from the center to the end, and the strap of iron lies flat upon the anvil. But begin at the end, and each blow from the hammer, passing from the end toward the center, causes the iron to rise higher at the end. While this is not so noticeable in the gold, owing to the first blow fastening it to the previous layer of gold, the tendency is the same—the gold is drawn away from the cavity wall, and all the malleting you can do will not place it in contact with the cavity wall (as it would have been had the condensation begun in the center) and a better margin will be made by finishing the malleting at the cavity wall. Care should be exercised not to use the plugger on the enamel margin until there is sufficient gold beneath the plugger point, so that when the blow is made the enamel will not be shattered under it. Many fillings are lost because of failure of the operator to observe this.—J. F. WALLACE, *Dental Era.*

A Treatment for Diseased Pulps.—Dr. Gillette Hayden recommends the following preparation in the treatment of diseased pulps:

Liquid:

Eugenol,	½ ounce
Black's "1, 2, 3,"	¼ "
Oil of cloves,	20 drops
Oil of cassia,	15 "
Oil of cinnamon,	15 "

Powder:

Zinc oxid.

The liquid and the powder are mixed together to form a stiff paste or cement, which may be used in any case where "toothache" is caused by a diseased but living pulp. By placing a filling of this preparation in the cavity of an aching tooth, an almost immediate cessation of pain is secured, as the medicaments in the formula act as obtunders, at the same time relieving the congested condition. In cases of acute pulpitis, especially where the pulp is exposed by caries, it is not necessary to remove the decay entirely, before placing the filling. The cement is slow to harden and will not stand the force of mastication for a few hours, but it will not wash out, either before or after hardening.

As long as the active agents in the cement exert their influence over the pulp there will be no pain or discomfort to the patient, and the pulp will return to as nearly a normal state as is possible under varying conditions. —*Exchange.*

A Few Reasons for the Failure of Fillings in the Approximal Surfaces of Bicuspids and Molars.—Among the various causes of failure in the preparation of cavities, I doubt if there is any that is responsible for more failures in approximal surfaces of bicuspids and molars than the failure to make a flat gingival seat upon which the filling may rest. The necessity for this, it would seem, is so apparent that none would neglect it, but from observation I am constrained to believe that many fail to realize the necessity for it, or are entirely indifferent as to the performing of the duty as they see it. When we remember that almost anyone is capable of exerting 150 pounds pressure upon the bicuspid and molar teeth, that many individuals exert 250 pounds, and an occasional man is found who is capable of exercising a force in occlusion of 375 to 400 pounds, with this immense force to be withstood could we expect a filling to remain in perfect contact with cavity walls that had anything but a flat gingival seat to rest upon? How often have we placed a filling in the approximal surface of a bicuspid or molar, polished or burnished (as most are likely to do) with the amalgam filling smooth with the cavity margin, and a few months later found it upon examination bulged from the cavity, leaving an open margin around the entire cavity capable of being seen by the naked eye, showing beyond doubt that the filling had left its original position in the cavity, causing an open margin, whereby bacteria might find lodgment where their labors of destruction might not be disturbed. This condition is in most cases due to the preparation of the cavity, and more particularly to the gingival seat, which in a large majority of cases is oval, both linguo-buccally and mesio-distally. If we hesitate for but a moment's consideration we could scarcely expect anything else of a filling built in a cavity with a gingival seat of such shape. When we consider that a filling must resist a force so great (because the entire force which the jaw is capable of exerting is often brought to bear upon the filling) we are not justified in expecting it to resist the pressure except

when built upon a flat gingival seat, both mesio-distally and linguo-buccally.—J. F. Wallace, *Dental Era.*

Cavity Preparation for Inlays.—The greatest stumbling-block to most of us when taking up the study of porcelain restoration lies in the fact that we cannot forget our cavity formation for gold; but, if we will only stop to consider the great difference between the two materials, and note that the one is brittle while the other is not, the one has little edge strength while the other is unlimited in that respect, is it not common sense to conclude that each must demand special consideration when preparing the cavity to recieve it? Margins for gold are beveled to prevent chipping them during the process of condensing the foil at that point, and also in occluding cavities to allow the gold to protect them from masticatory stress where they would probably chip or crumble if left sharp. Now, if sharp occluding enamel margins fail under gold, what is to prevent the breakage of like margins supported by cement reinforced by porcelain? It is generally understood that cement is quite temporary on occluding surfaces, as an entire filling; and the rule holds good in the case of the thin layer of cement between the tooth and porcelain filling when exposed to wear and stress, because all admit that cement in the smallest aperture will wear somewhat, and if so, are not the sharp, unprotected margins of the cavity on one side and of the filling on the other left exposed to the stress of mastication, which is sure in time to chip them down to the cement? This condition, again, leaves the cement re-exposed to wear, and so on. It is therefore impossible to so place a margin of porcelain filling upon a point exposed to masticatory forces, that will not chip at that point.—C. N. Thompson, *American Dental Journal.*

Why Round-faced Pluggers Should be Employed.—The spreading properties of gold are so well known that it seems scarcely worth while to dwell upon them, yet there are many dentists who fail to take advantage of the well-known characteristic in operative procedures. A mechanic understands the value of a convex face on one of his hammer heads when riveting a bolt or spreading a metal plate. The dentist in his laboratory knows how to take advantage of the spreading property of gold in swaging a plate around a remaining tooth, or over the heel of the process, or, if he has made a crown band too small, it is readily stretched by laying over the convex surface of a projection from the anvil and tapping with a flat-faced hammer, thereby spreading portions of the mass. The gold-beater depends upon the convexity of his hammer as he beats the gold leaf to spread it in the vellum clutch or molds from an inch square to the usual four-inch-square size. Indeed, the malleability of gold seems to be well understood by our profession in every department of constructive work except operative procedures at the chair. If search be made through the pluggers of the supply houses, very few will be found whose impacting points are other than flat, whatever the form of the plugger end may be, and fewer still will be found, in proportion to the number kept, in the individual dental equipment; yet a mass of gold melted and run into a cylindrical form and placed in a circular cavity with parallel walls, not too deep, and just large enough to take the cylinder—allowing it to slip in and out readily—can be so "riveted" or spread in the cavity with a convex-faced plugger that it will be made to fit the cavity and hermetically seal the orifice. How much better this can be done by spreading the gold piece by piece as inserted, spreading the mass laterally, causing it to hug tightly the cavity wall from the base or seat to the surface! I feel sure that practitioners generally have not understood the ease with which moisture-tight fillings can be made by taking advantage of this characteristic of gold, and remembering that a flat-faced plugger will not spread the mass. —D. M. Cattell, *Dental Review.*

Ethyl Chlorid: a word of warning.—The *British Journal of Children's Diseases* for April 1905 calls attention in an editorial to the fact that at a recent meeting of the Society of Anesthetists several fatalities were reported during the administration of ethyl chlorid. Last June this journal published a paper read by Mr. Chaldecott before the Society for the Study of Disease in Children, on the use of ethyl chlorid as a general anesthetic, in which, after attention had been drawn to the many advantages of the drug, and to the cases for which it was most suitable, it was very clearly laid down that the agent in question is a very powerful anesthetic and should only, except under circumstances of extreme urgency, be administered to patients who have been properly prepared. Since that time, however, ethyl chlorid has attained a very widespread popularity, and owing doubtless to the ease with which complete anesthesia may be induced by its use, there is considerable risk of its being em-

ployed in a haphazard fashion and in unsuitable cases. It is not suggested that any of the reported fatalities were due to either of these causes, but their occurrence certainly proves that its administration is not by any means free from danger to life.

As suggested at the meeting of the Society of Anesthetists, there are several precautions which should be observed: (1) The patient should be prepared as for chloroform or ether; (2) care should be taken not to present at first too large a dose; (3) a prop should always be inserted between the teeth; (4) the patient should be allowed to rest for some time after administration, as faintness occasionally supervenes, especially when a large dose has been given; (5) the drug should not be sprayed directly upon the mask close to the patient's face.

There can be no doubt that the introduction of ethyl chlorid as a general anesthetic is a very important innovation, especially valuable in the case of children, and it would be a matter for regret if the drug were to fall into disrepute through accident caused by disregarding such dangers as must inevitably attend the administration of so powerful and rapid an anesthetic agent.—*Therap. Gazette.*

Dentistry, Ancient and Modern.—In the *Nuova Antologia* (Rome) is a curious article by Ernesto Mancini on "Teeth and Dentists in Ancient Times," with a number of illustrations of dental work among the ancients, from museum specimens. The first mention of tooth-extracting in literature seems to be by Cicero, who names Æsculapius (the third) as the inventor of purges and the art of extracting teeth, some thirteen hundred years before Christ. Hippocrates, four centuries before Christ, wrote much about the care of the teeth, and a tomb at Tanagra, of about that period, furnished a set of false teeth. The collector of this relic has also found in Greek tombs teeth filled with gold. But before Greece, dental art flourished in Assyria, in Egypt, and in Phœnicia, and from there the art reached the Etruscans. Benzoni asserts that he has found artificial teeth of sycamore wood attached by gold wire to sound teeth of mummies, and also in mummies from Thebes decayed teeth filled with gold so well that the metal adhered perfectly to the ivory. Other authorities deny this or claim that the art, if known, was not practiced on account of religious objections. Various public and private collections have specimens of ancient dental work. The illustrations given are of Phœnician teeth bound together with gold wire, gold teeth in the Etruscan museum, and the Bruschi-Falgari museum, of Corneto, Italy, and a specimen that is practically "bridge work" three thousand years old, found at Cerveteri, and now in the Castellani private museum. The museum of Pope Julius, at Rome, has a skull with a plate fitting over three sound teeth and having a compartment for a false tooth. In the museum at Florence is perhaps the oldest specimen of dental work in Italy—a skull with the incisors bound with a gold band, and dating from the fifth century before Christ, according to the pottery found in the same Tarquinian tomb. Dentistry declined in Europe after the early centuries of the Christian era, and St. Louis of France is said to have had but a single tooth left at his death, while Charles the Bold was recognized dead on the field of Nancy by the gaps in his set of teeth. The Arabs kept up the best Greek practice, and late in the sixteenth century dental protection became common in Europe. Paré, the physician of Charles IX, was an expert dentist, and the first to transplant living teeth successfully. He filled teeth with cork and lead, reserving gold for royal mouths. Toothbrushes did not come into use until the eighteenth century, and princesses such as Marie Josephine of Saxony in 1747 had their special tooth-polishers as they had their barbers and dancing masters.—*Exchange.*

The Causes of Odontalgia.—Toothache, or odontalgia, is not a disease in itself, but a symptom, and we should apply the term to pain distinctly referred to an individual tooth, distinguishing it from neuralgia, in which the pain is not referred to the tooth or is only associated with local toothache. By some authors the term "odontalgia" is used to indicate pain in or around teeth, and treated under the headings of local and referred odontalgia; but I think that, at all events for the purposes of discussion, it is better to confine the term odontalgia to cases of toothache in which the pain is definitely referred by the patient to a particular tooth or teeth, and consider all cases of referred toothache under the subject of neuralgia. It is very difficult, however, to draw a hard-and-fast line between neuralgia and toothache, as the latter is often associated with neuralgia and frequently assumes a neuralgic character. When pain is due to irritation of the pulp without exposure it is local in character, the tooth is very sensitive to heat and cold, and is readily distinguished as the exciting cause of the odontalgia. It is otherwise, however, when the pulp is exposed, whether from caries or accident; violent pain may be caused by the application of heat or cold, but the pain is frequently referred to some other region, and the

tooth as the exciting cause may be overlooked; the pain has become neuralgic.

The exciting causes of toothache are:

1. Irritation and exposure of the pulp from caries, erosion, or attrition.

2. Secondary deposits in the pulp—as "pulp-stones" in caries—sometimes giving rise to odontalgia, but very frequently to referred neuralgic pain.

3. Localized suppuration of the pulp. Very severe toothache is caused by local suppuration in the pulp, especially when confined under a filling. Intense local pain is often experienced when the pent-up pus is allowed to escape on removal of the filling, the alteration of blood pressure in the pulp appearing to be the cause of this very severe paroxysm.

4. Direct traumatism—exposure by fracture of the tooth.

5. Exostosis—cementosis. The pain is both local and diffused, percussion causing distinct pain in the tooth.

6. Pericementitis, due to direct injury or septic extension from the pulp. The pain in inflammatory conditions of the peridental membrane is of a more continuous character and associated with great local tenderness.

7. Alveolar abscess.

8. Pain from exposure of the cementum in pyorrhea.

9. Necrosis of the root.

10. Pin-point absorption of the end of the root, in which the irregularity of the process of absorption leaves sharp spicules of cementum and dentin surrounding the nerve trunk that cause severe local pain, especially on pressure—a condition of the tooth very difficult to diagnose.

11. Difficult eruption and malposition of teeth, as from impacted third molars. The pain from this cause would, however, usually fall under the head of neuralgia.

The pulp of a tooth being very freely supplied with bloodvessels and nerves and closely confined within a hard resisting cavity, is especially prone to suffer from acute inflammatory conditions, the swelling which accompanies the inflammation leading to severe pressure upon the pulp tissue.

Caries causes toothache by direct exposure of the pulp, or by penetrating to within a short distance of the pulp, the softened dentin allowing the passage of various irritants, as thermal changes, acids, etc.; but it is a fact that has been often noted that caries in its early commencement will often cause toothache, although when the disease is further advanced there may be little or no pain, but it recurs with great intensity when the pulp at last becomes exposed. Our present knowledge of dental histology does not enable us to explain exactly how sensation is conveyed from the enamel, an extravascular tissue, to the pulp, the intermediate tissues remaining intact. The same conditions which cause localized toothache may also give rise to neuralgia.—J. Howard Mummery, *British Medical Journal.*

OBITUARY.

DR. GEORGE B. HARRIMAN.

Died, at Moosehead, Maine, May 22, 1905, of pneumonia, George B. Harriman, D.D.S., of Boston, Mass.

George B. Harriman was born at Groton, New Hampshire, March 18, 1837. He received his preliminary education at New Hampton Institute, studied dentistry under John Clough, M.D., of Boston, in 1857, and entered practice in 1858.

After several years of practice he entered Boston Dental College as a student, and was graduated in 1870. The next year he was elected dean of the college, in which capacity he served for two years; later he was chosen trustee and remained a member of the board until after the school was transferred to the Tufts College corporation.

As a student at the college he became deeply interested in microscopy under Prof. Rufus King Brown, and for several years was an enthusiastic student of that science, conducting certain important investigations. For a time he was professor of histology and microscopy at the college.

Dr. Harriman was one of the eight graduates who met in one of the lecture rooms of the old college, at No. 5 Hamilton Place, on March 4, 1872, and founded the Boston and Tufts Dental Alumni Association. He was

chairman of the executive committee during the first two years of its existence, was president in 1897, again chairman of the executive committee in 1898, and an active member until his death.

For a long time he suffered from asthma and had gradually withdrawn in part from active practice. Last March he closed his office on Park street and went to California, returning early in May. It has been his custom for several years to visit the Moosehead region on the opening of the fishing season in the spring; and though urged by friends not to do so this year, he went to Moosehead Lake on May 13th, accompanied by Mrs. Harriman. There pneumonia supervened, and he died on the 22d. As has been beautifully said, "The call of the Wild led him back close to Nature's heart, and with his head on her bosom he slept."

Dr. Harriman was a prominent Freemason, a life member of Boston Commandery, and an earnest supporter of the First Free Baptist Church of Roxbury. Though he never aspired to salaried political office, he was at one time active in Republican politics, serving as a member of the state central committee. He was a man of moderate wealth, of sterling character and Christian brotherhood. He leaves a widow, his second wife, and three sons.

Resolutions of Regret.

In respect to his memory, the Boston and Tufts Dental Alumni Association adopted the following resolutions on October 11th:

Whereas, The hand of Providence has removed from us our honored member and colleague, Dr. George B. Harriman; and

Whereas, In his decease we have lost one of the founders of our association, who in committee, as president, and as an active member until his death evinced a warm interest in its welfare; who as dean, as professor, and as trustee of our alma mater gave to her freely of his wisdom; and who in many years of practice set before us a worthy example of fidelity to his patients, of fairness toward his colleagues, and of kindly interest in his younger professional brethren; therefore be it

Resolved, That we desire to express to the bereaved family our sympathy and sorrow in their affliction, and our admiration for the professional and personal qualities of our colleague; and be it further

Resolved, That these resolutions be spread upon the records of our association, and that a copy be sent to the family of our departed brother, and to the dental journals for publication.

Fred'k S. Fogg,
E. W. Branigan,
James R. Piper,
Committee.

Marion L. Woodward,
Recording Secretary.

DR. ROBERT FRANCIS HORNE.

Died, at Watertown, Mass., June 5, 1905, from angina pectoris, Robert Francis Horne, D.D.S.

Dr. Horne was born in Watertown, October 15, 1843. Having decided to pursue the study of dentistry he matriculated in the Boston Dental College, from which institution he was graduated with the D.D.S. degree in 1870. He entered the practice of dentistry, upon graduation, at Bridgewater, Mass.

Dr. Horne was active in society work, and as a member of the American Academy of Dental Science and of the Massachusetts State Society did much toward their benefit and advancement.

A man of many excellent qualities, esteemed and respected by his friends, in his death the community of which he was an honored citizen loses one of its worthiest members.

He was married in 1869 to Miss Deborah C. Gilkey, of Watertown, who survives him, together with a son and a daughter.

DR. HENRY E. MANN.

Died, at New Bedford, Mass., June 18, 1905, from cardiac disease, Dr. Henry E. Mann.

Born in Nantucket, Mass., October 4, 1844, Dr. Mann began the study of dentistry in 1861 with Dr. E. G. Ward, and afterward studied with Dr. A. Tobey. He commenced practice independently in 1869, at 139 Purchase street, New Bedford, and continued there uninterruptedly up to the time of his demise.

He was married in 1865 to Miss Mary A. Gifford, of New Bedford, who, together with a son, survives him.

SOCIETY NOTES AND ANNOUNCEMENTS.

INSTITUTE OF DENTAL PEDAGOGICS.

THE annual meeting of the Institute of Dental Pedagogics will be held in the Fifth Avenue Hotel, New York, December 28, 29, and 30, 1905. The following subjects will be discussed: Anesthesia, extraction, operative and prosthetic technics, crown and bridge work, orthodontia, porcelain technics, chemistry, anatomy, and oral surgery, teaching in the infirmary.

The main discussion will be "How should these subjects be presented to a dental student?" This will be the most important dental meeting of the year, especially for teachers. As far as possible, all demonstrators as well as professors, should make an effort to be present.

W. E. WILLMOTT, *Sec'y*,
Toronto, Ont.

FRATERNAL DENTAL SOCIETY OF ST. LOUIS.

FIRST ANNUAL CLINIC.

THE first annual clinic of the Fraternal Dental Society of St. Louis will be held November 20 and 21, 1905, at the Barnes Dental College.

Special features of the meeting will be a series of lectures on "Cavity Preparation," "Methods and Principles of Packing Gold," and "Methods and Principles of Finishing Fillings," by Dr. E. K. Wedelstaedt of St. Paul.

The following well-known members of the Black and Wedelstaedt clubs will be present and clinically demonstrate "extension for prevention" to its fullest extent: Drs. A. C. Searl, Owatonna, Minn.; J. F. Wallace, Canton, Mo.; C. N. Booth, Cedar Rapids, Iowa; J. J. Booth, Marion, Iowa; Wm. Finn, Cedar Rapids, Iowa; J. B. Pherrin, Central City, Iowa; Ed. S. Brown, Edina, Mo.; W. T. Rutledge, Monroe City, Mo.; and S. E. Wallace, La Belle, Mo.

Porcelain work will be fully demonstrated by Drs. F. E. Roach, Chicago; W. L. Ellerbeck, Salt Lake City; Geo. T. Banzet, Chicago; W. H. Cudworth, Milwaukee, and Craig M. Work, Ottumwa, Iowa.

Other clinics on various subjects will be given by Drs. W. L. Reed, Mexico, Mo.; J. B. Howell, Paducah, Ky.; C. L. Rose, Fargo, N. D;. F. B. Lawrence, El Dorado, Kan.; Geo. D. Sitherwood, Bloomington, Ill.; A. Gaiser, Davenport, Iowa; Fred Westerfield, St. Charles, Mo.; Otto J. Fruth, St. Louis; Richard Summa, St. Louis; and others.

The following dealers have signified their intention to be present and display The S. S. White Dental Mfg. Co., Jenkins' porcelains—Klewe & Co., A. C. Clark & Co., St. Louis Dental Mfg. Co., John T. Nolde Dental Mfg. Co., Hisey Dental Mfg. Co., Denthol Chemical Co., Lambert Pharmacal Co., Lee S. Smith & Son, Century Dental Laboratory Co., W. M. Berry Dental Laboratory Co., R. C. Brophy & Co., Keeton-Williams Gold Co., Horlick's Food Co., Kress & Owen Co., Oakland Chemical Co., McKesson & Robbins, and others.

The Western Passenger Association and Southwestern Excursion Bureau have granted a rate of *one and one-third* fare, plus twenty-five cents validation fee—certificate plan—for this meeting for the states of Missouri, Iowa, Minnesota, Kansas, Nebraska, and Illinois, on and west of the line of the Chicago and East Illinois Railroad.

Hotel headquarters at Hotel Jefferson, 12th and Locust sts. Rooms, without bath, $1.50 and up; with bath, $2.50 and up. For two persons in one room, without bath, $1.00 each and up. For two persons in one room, with bath, $1.50 each and up.

Exhibit space may be obtained by application to the secretary. If you have a clinic to give, send your name at once to the supervisor of clinics. A cordial invitation is extended to the profession to be present and assist in making this meeting (limited in scope but

limitless in importance) the best ever held in this section.

BURTON LEE THORPE, *Pres.*
D. O. M. LECRON, *Supervisor of Clinics,*
Missouri Trust Bldg., St. Louis, Mo.
S. H. VOYLES, *Sec'y,*
306 Humboldt Bldg., St. Louis, Mo.

FIFTH DISTRICT (N. Y.) DENTAL SOCIETY.

THE semi-annual meeting of the Fifth District Dental Society of the State of New York will be held at Rome, N. Y., November 14 and 15, 1905.

W. H. LEAK, *Corresponding Sec'y,*
Watertown, N. Y.

OHIO STATE DENTAL SOCIETY.

THE fortieth annual meeting of the Ohio State Dental Society will be held in the Great Southern Hotel, Columbus, Ohio, December 5, 6, and 7, 1905. An exceptionally strong program of papers and clinics has been provided, and we have every assurance of a highly successful meeting. Come!

F. R. CHAPMAN, *Sec'y,*
305 Schultz bldg., Columbus, O.

SEVENTH AND EIGHTH DISTRICT (N. Y.) DENTAL SOCIETIES.

A UNION meeting of the Seventh and Eighth District Dental Societies of the State of New York will be held at the Osburn House, Rochester, October 31, November 1 and 2, 1905.

Mark these dates off in your appointment book and attend. It will be time well spent. If you have anything of interest communicate with the Business Committee.

C. F. BUNBURY, *Chairman,* Rochester,
J. W. GRAVES, Rochester,
S. ESCHELMAN, Buffalo,
D. H. YOUNG, Attica,
Business Committee.

F. MESSERSCHMITT, Rochester,
G. G. BURNS, Rochester,
Clinic Committee.

SOUTHERN CALIFORNIA DENTAL ASSOCIATION.

THE Southern California Dental Association will hold its eighth annual session in Los Angeles, Cal., November 6, 7, and 8, 1905.

CHAS. M. BENBROOK, *Sec'y,*
Los Angeles, Cal.

NEW YORK COLLEGE OF DENTISTRY.

CLASS DINNER—CLASS OF '97.

A class dinner of the Class of '97 of the New York College of Dentistry will be given in New York on the third Saturday in November (18th). For particulars address

Z. P. FULLER,
110 S. Elliott Place, Brooklyn, N. Y.

MARYLAND BOARD OF DENTAL EXAMINERS.

THE Maryland Board of Dental Examiners will meet for examination of candidates for certificates on November 6 and 7, 1905, at the Baltimore College of Dental Surgery, at 9 A.M.

For application blanks and all information apply to

F. F. DREW, *Sec'y,*
701 N. Howard st., Baltimore, Md.

DENTAL COMMISSIONERS OF CONNECTICUT.

THE Dental Commissioners of the State of Connecticut hereby give notice that they will meet at Hartford on Wednesday, Thursday, and Friday, November 8, 9, and 10, 1905, to examine applicants for license to practice dentistry, and for the transaction of any other business proper to come before said meeting.

Practical examination in operative and prosthetic dentistry will be held Wednesday November 8th. The written theoretical examination will be held Thursday and Friday, November 9th and 10th.

All applicants should apply to the recorder for proper blanks and rules for conducting

the examination. Application blanks must be filled in and sworn to, and with fee, filed with the recorder on or before November 1, 1905.

By direction of the Dental Commissioners,

GILBERT M. GRISWOLD, *Recorder*,
783 Main st., Hartford, Conn.

NEW HAMPSHIRE BOARD OF REGISTRATION.

THE New Hampshire Board of Registration in Dentistry will hold their next examination of candidates for registration December 12, 13 and 14, 1905, at Manchester House, Manchester, N. H.

A. J. SAWYER, *Sec'y*,
Manchester, N. H.

ILLINOIS BOARD OF DENTAL EXAMINERS.

THE regular annual meeting of the Illinois State Board of Dental Examiners, for the examination of applicants for a license to practice dentistry in the state of Illinois, will be held in Chicago, commencing Tuesday, November 14th, and continuing to Saturday, November 18th, inclusive.

Persons in possession of the following requirements will be eligible to take the examination: First, Any person who has been engaged in the actual, legal, and lawful practice of dentistry or dental surgery in some other state or country for five consecutive years just prior to application: or (Second) is a graduate of and has a diploma from the faculty of a reputable dental college, school or dental department of a reputable university; or (Third) is a graduate of and has a diploma from the faculty of a reputable medical college or medical department of a reputable university, and possesses the necessary qualifications prescribed by the board.

Candidates will be furnished with proper blanks and such other information as is necessary, upon application to the secretary. All applications must be filed with the secretary five days prior to the date of examination.

Address all communications to

J. G. REID, *Sec'y*,
1204 Trude Bldg., Chicago, Ill.

IOWA BOARD OF DENTAL EXAMINERS.

THE Iowa State Board of Dental Examiners will hold its next meeting for examination of candidates in the Capitol building, Des Moines, Iowa, December 12 and 13, 1905, beginning at 9 A.M.

For application blanks and all information apply to

E. D. BROWER, *Sec'y*,
Le Mars, Iowa.

OHIO BOARD OF DENTAL EXAMINERS.

THE regular semi-annual meeting of the Ohio State Board of Dental Examiners will be held in Columbus, November 28, 29, and 30, 1905, at the Hartman Hotel.

Applications for examination should be filed with the secretary by November 18th. For further information address

H. C. BROWN, *Sec'y*,
185 E. State st., Columbus, O.

INDIANA BOARD OF DENTAL EXAMINERS.

THE Indiana State Board of Dental Examiners will hold their next regular meeting at Ft. Wayne, Ind., January 9, 10, and 11, 1906, in the office of Dr. J. S. McCurdy. All applications for examination must be filed with the secretary not later than January 4th.

For further information apply to

F. R. HENSHAW, *Sec'y*,
Middletown, Ind.

OKLAHOMA BOARD OF DENTAL EXAMINERS.

THE Oklahoma Board of Dental Examiners will hold their next regular meeting at Oklahoma City, Tuesday and Wednesday, November 14 and 15, 1905, for the examination of candidates.

Oklahoma has a new dental law that became operative June 1, 1905, requiring all applicants for registration—whether graduates or not—to take the examination. It is to be theoretical and practical in character, and instruments for operative and prosthetic

work must be furnished by the applicant. Examination fee is $25.00.

Further information will be given by the secretary, as well as blanks furnished upon application.

A. C. Hixon, *Sec'y*,
Guthrie, Okla.

NEW JERSEY BOARD OF REGISTRATION AND EXAMINATION.

The New Jersey State Board of Registration and Examination in Dentistry will hold its semi-annual meeting in the theoretical branches in the assembly chamber of the state house at Trenton, N. J., December 12, 13, and 14, 1905. Sessions begin promptly at 9 A.M. each day.

Practical operative work at the office of the examiner in practical operative work, Dr. C. S. Stockton, 22 Central ave., Newark, N. J. Practical prosthetic work at the office of Dr. A. Irwin, 425 Cooper st., Camden, N. J. All practical work appointments secured from the examiners of those branches.

Application must be in the hands of the secretary two weeks prior to the examination.

Charles A. Meeker, *Sec'y*,
29 Fulton st., Newark, N. J.

PENNSYLVANIA BOARD OF DENTAL EXAMINERS.

The Board of Dental Examiners of Pennsylvania will conduct examinations simultaneously in Philadelphia and Pittsburg, December 12 to 15, 1905.

For papers and cards of admission address

N. C. Schaeffer, *Sec'y Dental Council*,
Harrisburg, Pa.

SOUTH DAKOTA BOARD OF DENTAL EXAMINERS.

The next meeting of the South Dakota State Board of Dental Examiners will be held at Sioux Falls, S. D., January 16, 1906, beginning at 1.30 P.M. All applicants for examination must bring diplomas from reputable dental colleges or affidavit of having been engaged in the practice of dentistry for at least three years immediately preceding said examination. Instruments and materials necessary to do all kinds of operative and prosthetic work will be needed at this examination. Vulcanizer and lathe will be furnished by the Board.

All applications must positively be in the hands of the secretary by January 9th.

G. W. Collins, *Sec'y*,
Vermillion, S. D.

NEW YORK INSTITUTE OF STOMATOLOGY.

Offer of Prizes.

With the desire of stimulating investigation in any field of activity directly relating to dental or oral science, the New York Institute of Stomatology offers two prizes for the best papers submitted to it embodying the results of such original research.

The first prize, for the best paper, will be a gold medal and $250; the second prize, for the next best paper, a gold medal and $100.

Conditions: (a) The papers offered for competition must be typewritten in English. (b) Must contain not less than 1500 nor more than 3500 words. (c) Must be signed by a motto or *nom de plume*. (d) Must be accompanied by a sealed envelope marked with the same motto or *nom de plume* on the outside, containing the true name as well as the motto of the contestant within. (e) Must be sent to the chairman of the Executive Committee, Dr. F. Milton Smith, 38 West 36th street, New York city, on or before March 1, 1906.

Judges: The following gentlemen have consented to act as judges—Dr. C. N. Johnson of Chicago, editor of *Dental Review;* Dr. Eugene H. Smith of Boston, dean of Harvard University Dental School; Dr. Wilbur F. Litch of Philadelphia, editor of *Dental Brief*.

Rules.

1. The papers will be sent to the judges without the sealed envelopes, containing the names of the contestants, which will be retained by the Executive Committee till the decision of the judges is made.

2. In deciding on the merits of papers offered in competition the judges will be requested to take into consideration the value and character of the research work the results of which are presented, more than the literary character of the essays, but to give the latter due credit.

3. The judges are expressly authorized to decide which if any of the papers submitted to them are of sufficient merit to entitle them to the prizes offered, or to withhold the award from all the papers if none are deemed worthy.

4. Authors of the prize papers will be invited to read their essays before a meeting of the Institute, as will the writers of other papers of especial merit, the Institute reserving the right to the first publication of all papers offered in competition.

Papers not used will be promptly returned to the writers. Those read before the Institute will be as fully discussed as possible and when published will be adequately illustrated.

For further information address

DR. F. MILTON SMITH,
38 West 36th st., New York, N. Y.

ARMY DENTAL CORPS.

DENTAL Surgeon S. D. Boak, now at Fort Myer, Va., will proceed with his outfit and enlisted assistant to Fort Washington, Md., for temporary duty. (September 7, D. E.)

Contract Dental Surgeon Edwin P. Tignor, on completion of his duties at Malahi Island, Laguna de Bay, will proceed to Camp Stotsenburg, Pampanga, for duty, relieving Contract Dental Surgeon George E. Stallman, who will proceed to Camp Wallace, Union, for duty. (August 1, D. Luzon.)

Dental Surgeon Croxton L. Rion will proceed from Paris, Ky., to San Francisco, Cal., and take transport to sail about October 5, 1905, for Manila, for duty. (September 26, W. D.)

Contract Dental Surgeon Ralph W. Waddell, Fort Leavenworth, will proceed on November 1, to Fort Crook, Neb., for temporary duty not exceeding one month. Upon completion of this duty he will proceed from Fort Crook to Fort Mackenzie, Wyo., for temporary duty for such time as may be required not exceeding fifteen days, and then return to Fort Leavenworth. (October 7, D. Mo.)

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING SEPTEMBER 1905.

September 5.

No. 798,852, to DAVID D. WEISELL. Anesthetic generator and mixer.

September 12.

No. 799,495, to LEON L. POSTON. Porcelain tooth-facing.

September 19.

No. 799,724, to ADAM W. FELTMANN. Dental tool.

No. 799,937, to JOSEPH A. REID. Dental crown or plate swaging device.

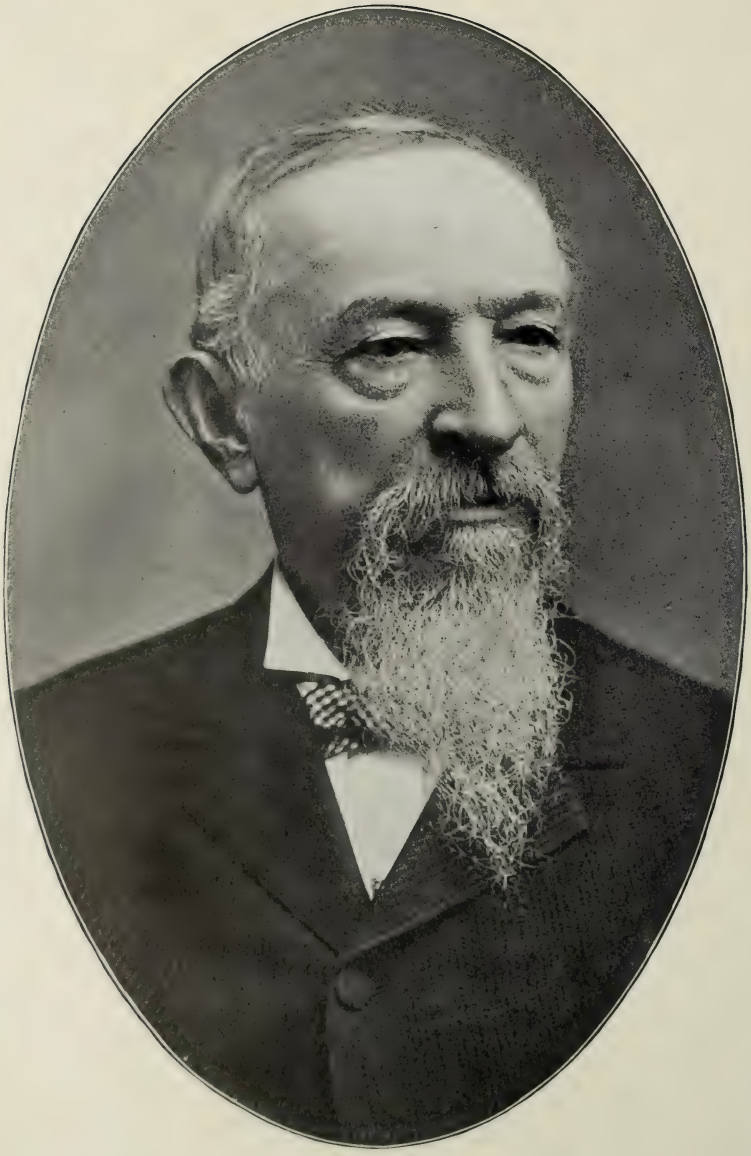
No. 800,093, to WILLIAM S. FILLEY. Dental device.

September 26.

No. 800,193, to SAMUEL E. WILHELM. Method of making shell gold crowns for teeth.

No. 800,401, to MARK T. ROUNDS. Tooth-powder bottle.

No. 800,498, to LYMAN L. SHEFFIELD. Dental waste cotton receiver.



DR. R. ALLISON MILLER.

THE

DENTAL COSMOS.

VOL. XLVII. DECEMBER 1905. No. 12.

ORIGINAL COMMUNICATIONS.

OPEN- AND CLOSE-BITE MALOCCLUSION.*

By CALVIN S. CASE, D.D.S., M.D., Chicago, Ill.

OPEN-BITE MALOCCLUSION.

IN the malocclusion which is characterized by an open bite, the front teeth are apart or open when the jaws are closed in an effort to masticate food. This character of malocclusion varies in its scope, from conditions in which only the second molars occlude, with the front teeth widely apart, to conditions in which all of the buccal teeth quite perfectly occlude, with the front teeth but slightly apart. A few typical characters of open-bite malocclusion are shown in Fig. 1. The impressions for these models were taken by pressing modeling compound against the teeth while the jaws were in masticating closure.

Occasionally the condition obtains far more upon one side than the other. Usually, however, the space between the upper and lower teeth quite uniformly increases from the point of occlusion toward the front, just as if the mandible had been bent downward or straightened at the angles of the rami. In fact, in pronounced cases where two or more teeth on each side occlude, the back ones will at times seem to have been driven into their sockets through the force of mastication, or prevented from growing to their full height, so that the tuberosities come into close proximity to the angles of the rami when the jaws are closed. The writer has met with a number of cases (however, older than twenty-five years) for which the entire forces of mastication had been sustained by single molars on each side, and with no apparent intrusion of these teeth.

While there are doubtless certain isolated cases of open-bite malocclusion caused from direct inheritance or the inheritance of syphilitic taint, and even from thumb and tongue-sucking, etc., these are not the typical open-bite occlusions to which the writer refers.

The principal if not the only cause of the typical form of open-bite malocclusion—in the writer's opinion—is long-continued mouth-breathing during the early years of childhood development. The common local causes of early mouth-breathing are enlarged tonsils, adenoid vegetations, or any of the diseases of the naso-pharyngeal passage which obstruct free breathing. The indulgence of

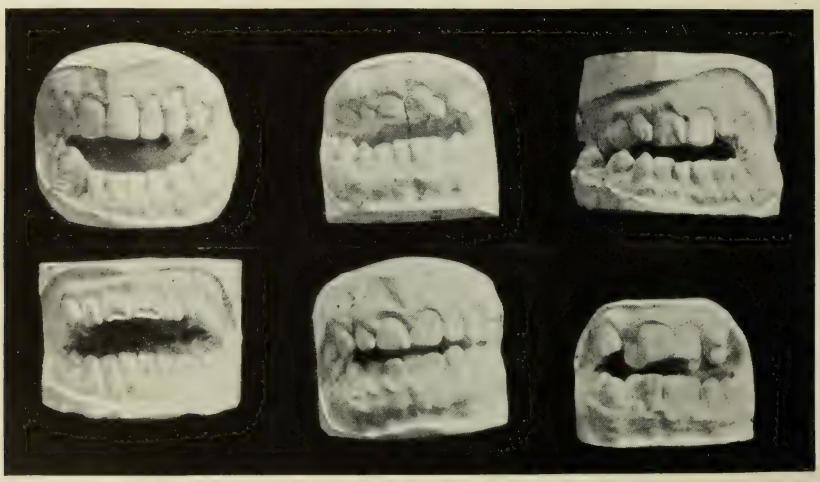
*Copyright, November 1905, by Calvin S. Case.

mouth-breathing may arise from an acquired or inherited habit without discernible abnormal conditions of the nasal tract; and again with a partial stenosis that obstructs free breathing yet one in which the mucous membrane is perfectly healthy. The habit quite commonly obtains with many people during sleep, who through a lifetime of this indulgence (or necessity) do not experience any physical ill-effects from it.

In the writer's opinion the *modus operandi* in the production of open-bite malocclusion from this habit is purely due to mechanical action of the muscles in holding the mouth open to breathe more freely. And as the action takes place principally during the involuntary activities of sleep, the mouth is usually gaped widely open. The mandible, with condyles resting in the glenoid fossæ as fulcrums, is pulled downward and held open by the hyoid muscles attached beneath the chin. Opposed to this force is the lifting action, principally of the masseter and internal pterygoid, at near the angles of the rami and body. These forces acting upon an undeveloped mandible during the early years of its immaturity in form will tend to straighten it, or, more correctly speaking, will prevent the rami from fully assuming their natural approach to a right angle with the body, thus causing the back teeth to occlude while the front teeth are more or less apart.* To more fully illustrate this proposition, glance at Fig. 2, which was taken from "Gray's Anatomy" and is intended to show the relative size and shape of the mandible at birth, puberty, and adult development, during which time the relation of the rami to the body changes from a decidedly obtuse to nearly a right angle.

From four to twelve years of age, when mouth-breathing from adenoid vegetations is quite common, the undeveloped quality of bone renders it quite susceptible of change in the form of its natural growth under the influence of slight but continued abnormal pressure. Fig. 3 is made from one of Dr. Cryer's illustrations of normal occlusion. In the picture shown on the right a portion of the mandible was removed, cut at the angle, and replaced in the position it might assume under slight continued force exerted during childhood in the di-

FIG. 1.



* This theory of the cause of open-bite occlusion was presented by the writer in a paper read before the Odontological Society of Chicago in March 1894, and published in the *Dental Review*. (See that journal for July 1894, page 511.)

rection of the arrows by the muscles while holding the jaws wide apart.

In many cases the relations of the rami and body may be seen from a profile view of the face to stand at a more obtuse angle than is normal—and with the frequent production of prognathism —both of which are well shown in Figs. 4 and 6.

I would ask anyone who doubts that mouth-breathing is the cause of the common open-bite malocclusion so frequently seen, to inquire in any case of typical open-bite whether the subject does not, or did not during childhood, sleep with the mouth open. If a negative reply be received, it will be because the observer's attention has not been called to it before, or because the subject has long recovered from the cause and the practice, and has forgotten.

While open-bite malocclusion may occur in connection with any compatible malposition of the teeth—for the same reason that children of all varieties of physiognomies may have conditions of the naso-pharyngeal tract which obstruct free breathing—in the experience of the writer it occurs far more frequently with that class of malocclusions which is characterized by a retruded upper and protruded lower.

When one considers the natural action of the causes which produce this character of open bite, this is readily accounted for. Any of the diseases which obstruct the normal development of the maxilla frequently result in a retrusion of the intermaxillary process and contained incisor teeth. Again, the concomitant mouth-breathing necessity which produces the open bite by causing the angles of the body and rami to become more obtuse, increases the distance from the point of the chin to the condyles, with a tendency to carry all of the lower teeth forward of their normal occlusion and dento-facial relations. If this forward movement of the mandible be sufficient

FIG. 2.

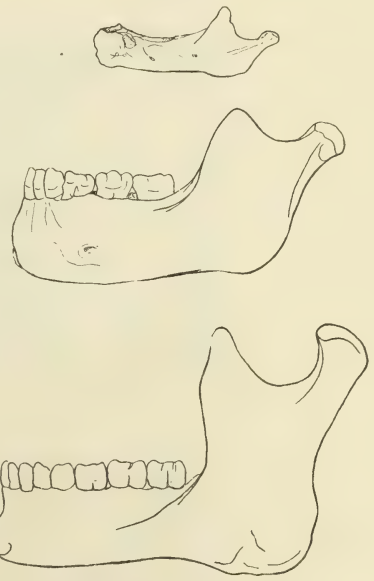
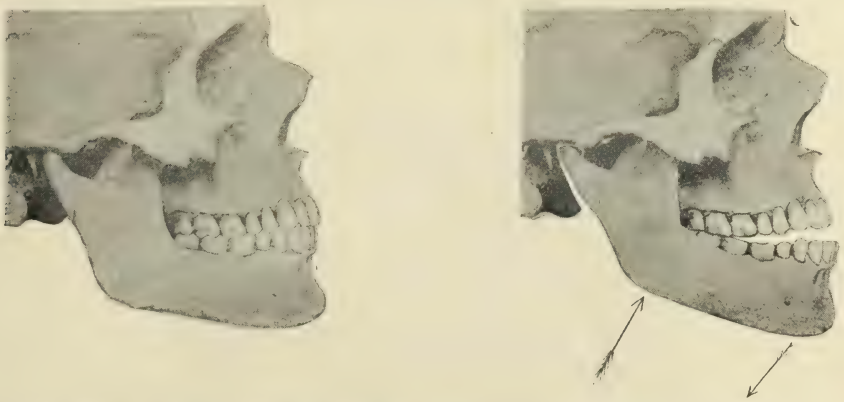


FIG. 3.



to carry the points of the occluding cusps slightly forward of their normal inter-

of the lower teeth and a retrusion of the upper.

Fig. 4.

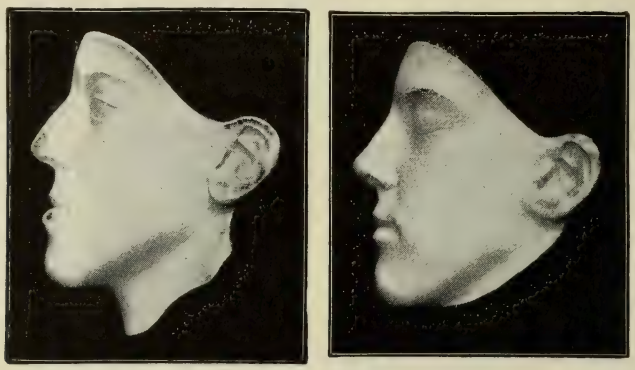


Fig. 5.



Fig. 6.



digitation, the forces of mastication, acting upon the inclined facets, will tend toward a further protruding movement

If this explanation be true, it will at once be seen that the above mal-relation of the upper and lower teeth may be

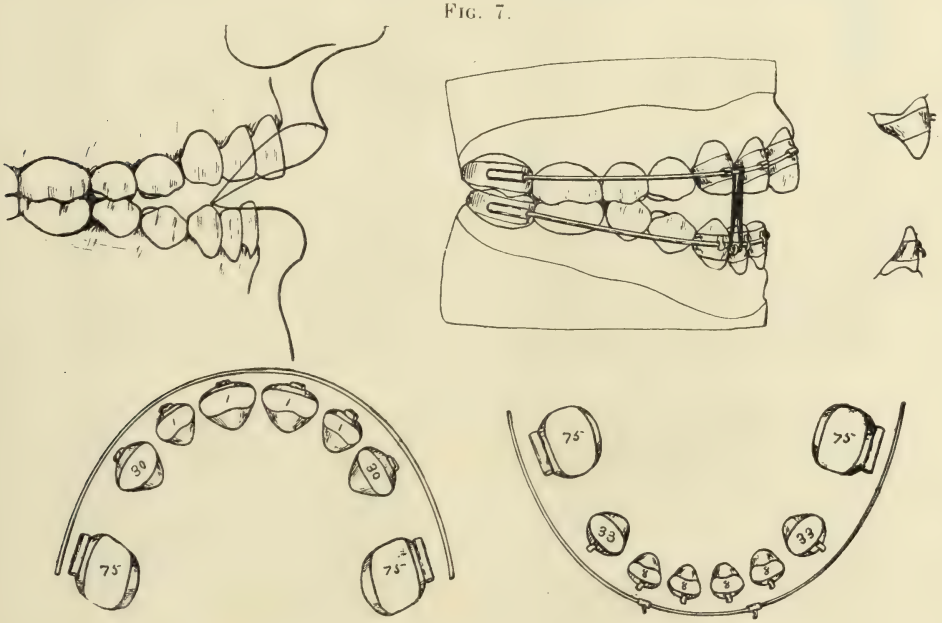
wholly produced by any of the diseases which may obstruct natural breathing through the nose during childhood, and upon any patient whose occlusion would have been otherwise normal. This also accounts for the probable fact that open-bite malocclusion occurs more frequently in connection with an undeveloped and retruded maxilla and a more or less prognathic mandible.

Inasmuch as mouth-breathing during childhood may also occur in connection with any of the inherent dento-facial malformations and irregularities of the teeth, we find open-bite malocclusions also occurring in every class of dento-facial irregularities; though if the malrelation due to mouth-breathing is pronounced it is reasonable to suppose that the force of its action will have changed to that extent the inherent character of the irregularity.

In those cases of open-bite malocclusion in which the antero-posterior relation of the upper and lower jaws and teeth are normal, the cause or causes which induced the mouth-breathing habit were probably not of a nature to obstruct the growth development of the maxilla. And, while the natural distance from the condyles to the point of the chin may have been increased in the mandible, it was not sufficient to carry the lower teeth materially in front of a normal occlusion. Again, it may have been a case in which the natural occlusion of the lower buccal teeth was distal to normal in relation to the uppers.

As open-bite malocclusion is seen to occur with only a comparatively few of the people who have indulged in the habit

FIG. 7.



of mouth-breathing, the question will naturally arise: If this be the cause of the typical open-bite, why is it not manifested in every case of mouth-breathing?

I can only answer this by saying that in holding the mouth open the muscles undoubtedly do not exert the requisite degree or quality of stress upon the mandible to obstruct its proper growth development.

We certainly find that mouth-breathing without open-bite malocclusion is quite prevalent from the aforesaid causes in many cases of upper protrusions characterized by a high and narrow dome. And though these cases at times —without, and even with an open-bite

malocclusion—will appear as if the forward growth of the mandible had been obstructed, characterized by a receding chin as in certain forms of degenerates, I do not see that that vitiates the theory that the principal if not the only cause of the typical open-bite malocclusion is due to the action of the muscles, as described, in holding the jaws widely apart during the developing stage of the mandible.

In the treatment of open-bite malocclusion, it is the writer's practice to correct the malocclusion partly by grinding the occluding buccal teeth and partly by extruding the labial teeth. Other complications, such as mal-alignments, protrusions, retrusions, disto-mesial malocclusions, etc., are treated the same as in other cases.

I prefer to correct the open-bite feature of the malocclusion more by a free grinding of the occluding surfaces of the buccal teeth, even to sacrificing the vitality of a molar on each side, than by extruding the labial teeth, because in the latter movement they are the most difficult of cases to retain. Moreover, the shortness of the lips in relation to the teeth, especially the upper, is frequently such as to preclude an extensive extrusion of the upper incisors.

When the malposition is not extensive, however, the labial teeth may be brought to their proper occluding plane principally by an extruding movement. In Fig. 7 arch bows with ends resting in molar tubes are attached to the malposed teeth with hooks or open-tube attachments. To the lower bow, spur tubes are attached with soft solder at the desired

Fig. 8.

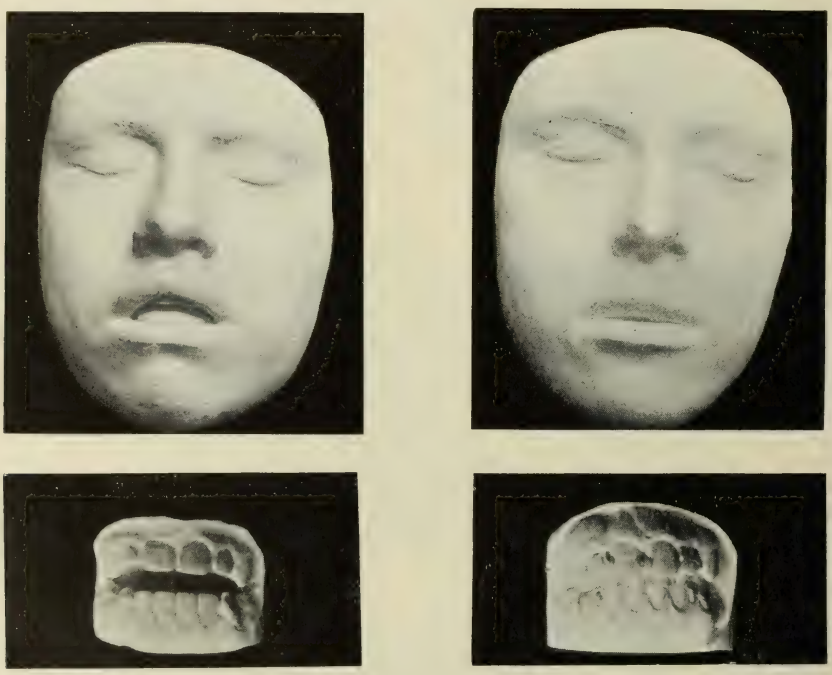


Fig. 9.



places, or spurs may be attached in like manner to both bows. From these, elastic rubber "election rings" are passed over the upper bow and back to the spurs, or the small elastic rings manufactured by Ash & Sons may be passed from the upper to the lower spurs. These are readily removed during eating and reattached by the patient.

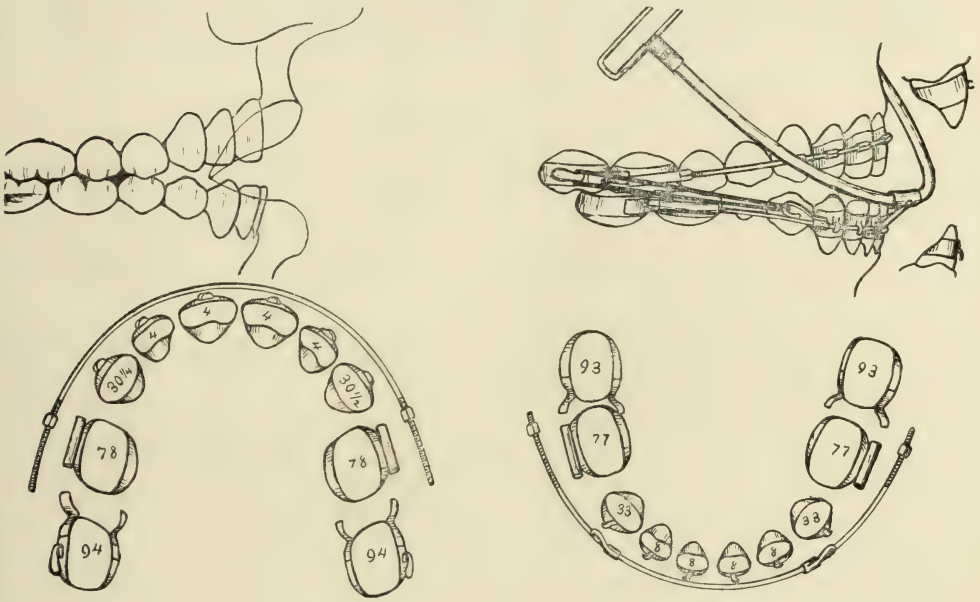
The principal difficulty in this class of irregularities is in retaining the positions of the mechanically extruded teeth, (1) because of the great tendency of the teeth to return to their former malposition, and (2) because of the difficulty in obtaining a retaining base of sufficient stability to combat the direction of the reacting forces toward intrusion.

If the bicuspids are not involved, a No. 19 or 20 resilient arch bow, with its ends resting in long tubes attached to the buccal teeth and passing over hooks on the labial teeth, will usually accomplish the objects both of extrusion and retrusion—the bow being sprung according to the demands. If nuts are not needed on the bow for extruding and retruding purposes, it may be slightly flattened its entire length by passing it through the rollers; then by resting the ends in flattened buccal tubes it will give a greater resilience to the bow and less irritation to the lips. When the upper and lower teeth are in normal alignment and antero-posterior relations the retaining appliance very imperfectly shown in Fig. 8 may be attached.

The principal technic construction of this appliance is described in the June Cosmos.* (See Fig. 9.) The variation from the regular retaining appliance that is here shown is the spurs which are attached to the interproximal extensions, for the attachment of elastic rings, the employment of which should be continued by the patient as long as there exists any tendency toward an opening of the bite.

In extensive open-bite cases all of the teeth except the molars may be involved, and occasionally only the first or second molars occlude, as shown in Fig. 6. If

Fig. 10.



*Calvin S. Case, "Principles and Technic of Retention in Orthodontia," Dental Cosmos, vol. xlvii. p. 649.

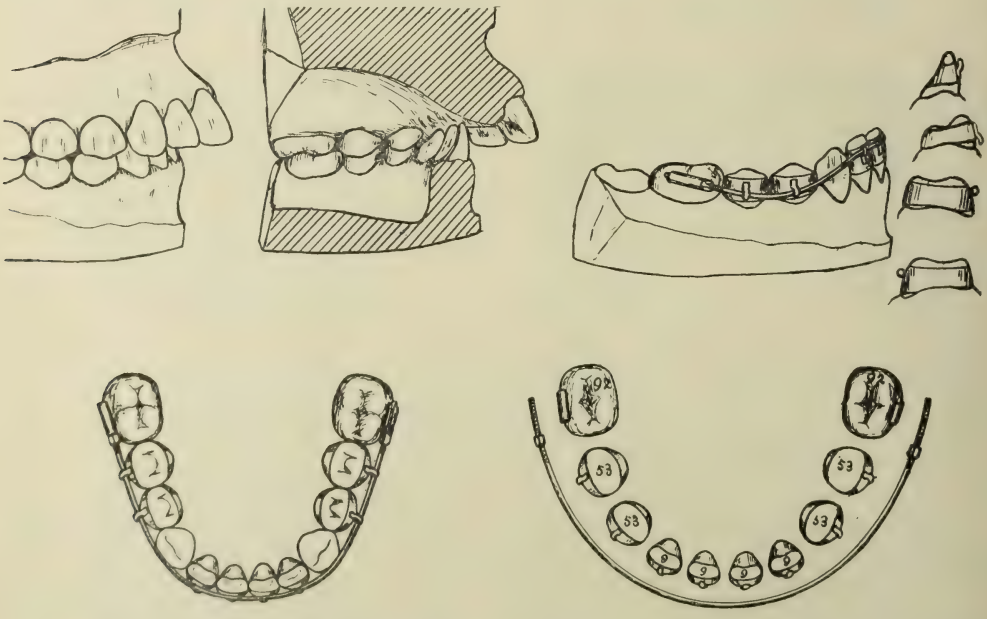
the patient is very young and the mandible is protruding—as frequently obtains in these cases—the occipital apparatus with chin-piece, if worn persistently, shown in Fig. 10 is one of the most effective methods of retruding the lower teeth and at the same time extruding the labial teeth, to aid in closing the bite.

Fig. 11.



may accomplish much good. If, however, the lower jaw be not protruding, the direction of the occipital force will tend to retrude it and therefore it should During the hours that the occipital force is applied, which will tend to keep the jaws closed, the disto-mesial intermaxillary elastics may also be employed as an

Fig. 12.



not be used on an undeveloped lower jaw.

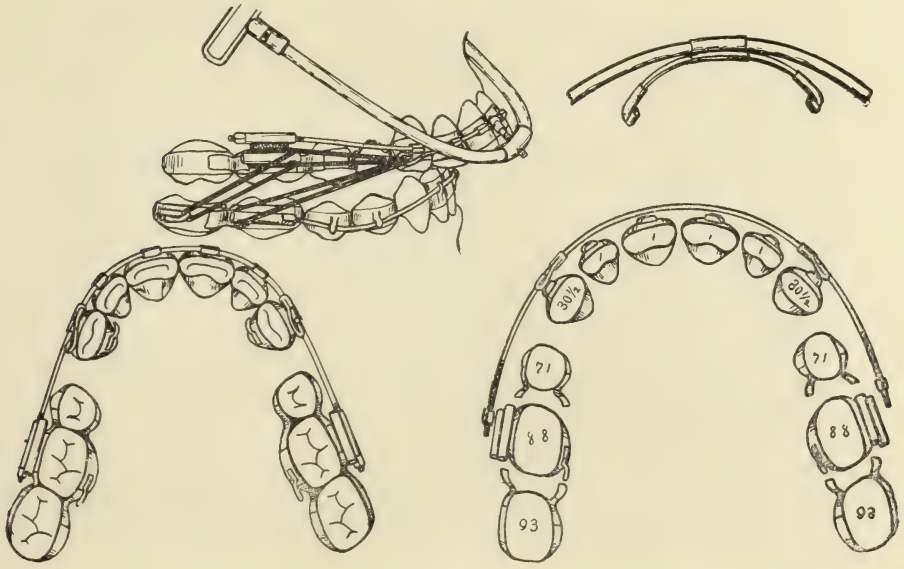
When the lower teeth are protruding in relation to the protruded lower jaw, as was shown in Figs. 1 and 5, the occipital apparatus with a bow similar to that auxiliary. At other times, when the mouth is open, the intermaxillary force attached to the upper molar teeth will tend to extrude them, and increase the extent of the open-bite occlusion. The direct intermaxillary force, however,

may be applied in these cases and worn at all hours.

It is to be understood, also, that whatever the irregularity besides the open-bite occlusion, the apparatus is to be so constructed and the proper forces applied that a concomitant correction may result.

Everyone who contemplates the correction of open-bite irregularities should fully understand that the difficulties and dissatisfaction that arise in the final retention of the corrected teeth are quite in proportion to the extent of the extruding movement and the number of teeth involved. In extensive cases, therefore, much may be gained by freely grinding the occluding surfaces of the antagonizing teeth. If it were for no other reason than the improvement in masticating possibilities, no one should hesitate to devitalize the upper molars if necessary for this purpose, to aid in closing the bite and in the greater possibility of permanence of retention.

Fig. 13.



CLOSE-BITE MALOCCLUSION.

In typical close-bite malocclusion, when the jaws are in masticating closure, the lower incisors usually strike the gum back of the upper incisors, and at times well back upon the lingual aspect of the alveolar ridge.

This character of malocclusion may occur in any irregularity in which the upper teeth in relation to the lower are quite decidedly protruded—the dento-facial extremes of which are protruded uppers with lower normal, and retruded lowers with upper normal. In the writer's experience it has occurred most frequently in retrusions of the lower accompanied with slight protrusions of the upper. In four of the five cases selected at random from many of this class, shown in Fig. 11, a close-bite malocclusion obtained, similar to that shown in Fig. 12. With the lower labial teeth in this position it can at once be seen that any attempt to retrude the upper labial teeth would drive the lower incisors farther into the gum, therefore the first demand is to open the bite by extruding the buccal teeth and intruding the incisors.

At the meeting of the Illinois State Dental Society in 1892, the writer presented the history of a case in which a close bite of the above character was

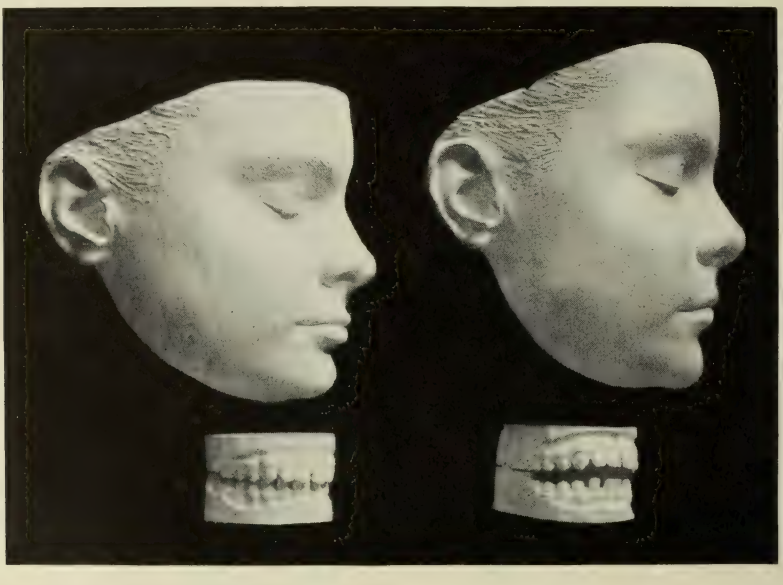
corrected by a rubber plate which prevented the buccal teeth from striking until they grew to the proper occlusal plane. This was published in the *Dental Review* of July 1892.

While the method has doubtless proved successful in other hands, it was discarded by the writer long ago with other forms of regulating plates and upon the establishment of the system of attaching force appliances to dental bands. It is therefore painful to see in some of the recently published textbooks my original illustration, together with a description of this obsolete method, presented as a thing of present value, when it should have been relegated to the past years ago.

In 1896 the writer produced another method of correcting close-bite malocclusion which he is pleased to see has become one of the practically efficient methods of orthodontia. By its application the difficulties of correcting this most annoying malocclusion of the teeth are removed.

As shown in Fig. 12, hollow crowns are fitted over the lower first molars, which at once opens the bite and forces the patient to eat for the time being upon the oldest and most firmly established teeth in the mouth. To the crowns are soldered buccal tubes, one of which is open, and to the bicuspids and incisors are attached bands which carry hooks placed in such a position that a resilient German silver bow No. 22 placed as shown will tend to extrude the bicuspids to the new plane of occlusion, and intrude the incisors.

Fig. 14.



The first molars are well calculated to withstand the strain of mastication until the bicuspids are lifted and the second molars grow to an occlusion of sufficient stability to take their share of the work. When the sockets of these teeth have become solidified the crowns and lower apparatus can be removed, whereupon the first molars will then grow to their proper occlusion.

The apparatus for retruding the upper labial teeth and correcting the distomesial malocclusion of the buccal teeth with the intermaxillary force may be placed when the lower apparatus is attached. In nearly all of these cases the writer utilizes the intruding and retruding tendency of the occipital force

upon the upper labial teeth, and the extruding tendency of the intermaxillary force upon the lower buccal teeth. (See Fig. 13.)

In many instances, as shown in Fig. 13, the extruding force of the intermaxillary elastics upon the buccal teeth will be sufficient in themselves to open the close bite without the placing of crowns.

FULL CLOSE-BITE MALOCCLUSION.

A very rare case of close-bite malocclusion, differing decidedly from the above, occurred in a miss of fourteen and has recently fallen under the writer's observation for treatment. It consists in all of the teeth, both front and back, being quite decidedly too short in relation to the occlusal plane of perfect dento-facial harmony. In other particulars the teeth are in fair alignment, antero-posterior relations, and occlusion, and when the jaws are held apart, with the lips in esthetic pose, or while talking or laughing, one would hardly imagine the existing state of malposition. But when the jaws are closed, with the buccal teeth in occlusion, the physiognomy is at once disfigured by an expression of maturity as in an edentulous patient, which is due to the unesthetic shortness of the distance from nose to chin and the abundance of labial and buccal tissues. (See Fig. 14.) Moreover, the difficulty of occluding the teeth, with a slight disturbance of the temporo-maxillary articulation, has led her to the use of the incisor teeth to a more or less extent for masticating purposes. On the left of the figure is shown the profile model and teeth while in masticating occlusion. I regret that it does not fully express the facial disfigurement, which is far more pronounced from the photograph of a plaster model. On the right the jaws were opened as shown, by placing between the teeth a piece of modeling composition, and while in that position the facial impression was taken from which the model and illustration were made. The proportionate excess of the lip tissue would have permitted the jaws to have been opened twice as far apart without disturbing the ease of a perfect closure of the lips. The model was made to show the dento-facial position and the outlines which I hope to attain by extruding all the teeth.

The apparatus which is now attached consists of four crowns placed upon the first molars, which opens the jaws to about one-half the desired extent, to start with. The bicuspids and labial teeth are all banded with attachments to support alignment arch bows with spurs for the attachment of the direct intermaxillary elastics, so as to extrude all of these teeth with a uniform movement, treating the case in this particular as though it were an open-bite malocclusion. Provision is also made for the attachment of the disto-mesial intermaxillary elastics for the purpose of closing the interproximal spaces and correcting the occlusion by a retruding movement of the upper labial teeth and a mesial movement of the lower buccal teeth.

THE DENTAL CONTENTS OF A DERMOID CYST.

By I. NORMAN BROOMELL, D.D.S., Philadelphia, Pa.

(Read before the Dental Society of the State of New York, at its thirty-seventh annual meeting, Albany, N. Y., May 12, 1905.)

A DERMOID cyst is an anomalous organism, a congenital tumor, so named from the fact that it is of epithelial origin, containing a conglomerate mass of tissue derived from the epiblastic layer of the blastoderm. The principal contents of these tumors are formed by a displacement or infolding of an embryonic epiblastic matrix. The fact that these young cells have wandered from their normal locality does not appear to interfere with their proliferation and their generative ability, and as a result they may occasion in whatever locality they become imprisoned tissues which are the product of their activity.

These cysts may be superficial or simple, or deep-seated and complex. In the superficial variety, epithelial products alone are usually formed, the contents of the cyst being made up of epithelial cells and their waste material mixed with serum, thus resembling the retention cyst of sebaceous glands. The simple superficial dermoid is established before the epiblastic cells differentiate to form the dermal appendages. The deep-seated tumors are somewhat later in being established, or at a time which corresponds to the appearance of the hair follicles, sebaceous glands, sweat glands, the teeth, nails, etc., and therefore any or all of those structures or their products may contribute to the complex character of such a cyst. In superficial dermoids the embryonic cells, while specialized for the purpose, remain connected with the surface epithelium; in the deep-seated variety the generative cells are necessarily completely separated from the primary germinal layer.

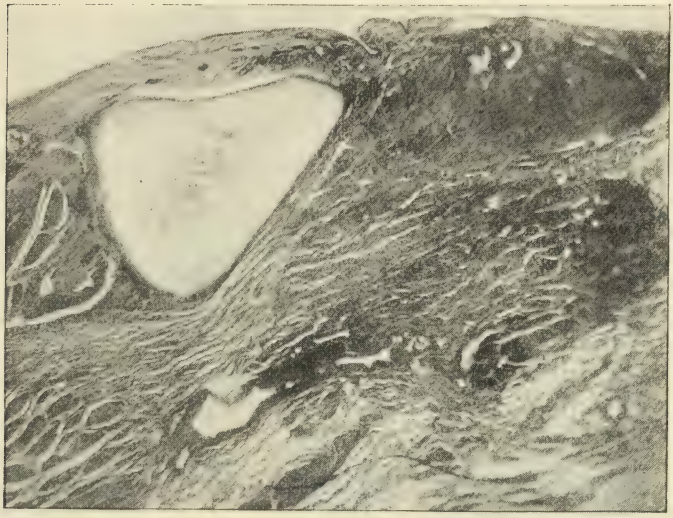
While most dermoids are lined with normal skin, many of them contain mucous membrane as well. Skin from the interior of a dermoid cyst has been successfully used for skin-grafting, the new skin thus formed showing all the properties of the true skin surrounding it.

Histologically the walls of a dermoid cyst are connective tissue with an epithelial lining of one or more layers. (Figs. 1 and 2.) While this is the common condition, it is not unusual to find the walls made up of a variety of structures —glands, masses of cartilage, and bone lying in close proximity to the epithelium being a very frequent condition. Hair is perhaps one of the most frequent cutaneous appendages of these cysts. This is always fine in texture, and often several feet in length. While in general the hair is light brown in color, regardless of the color of the hair on the surface of the body, it is inclined to turn white with age, and dermoids in persons affected with baldness are usually devoid of hair. Hair follicles which are histologically perfect are present. Dermoid cysts in birds contain feathers instead of hair, and in pigs bristles are present.

Growths of this character are not confined to animal life alone, but are present in vegetation, a fair example of this condition being shown in the orange known as the navel orange.

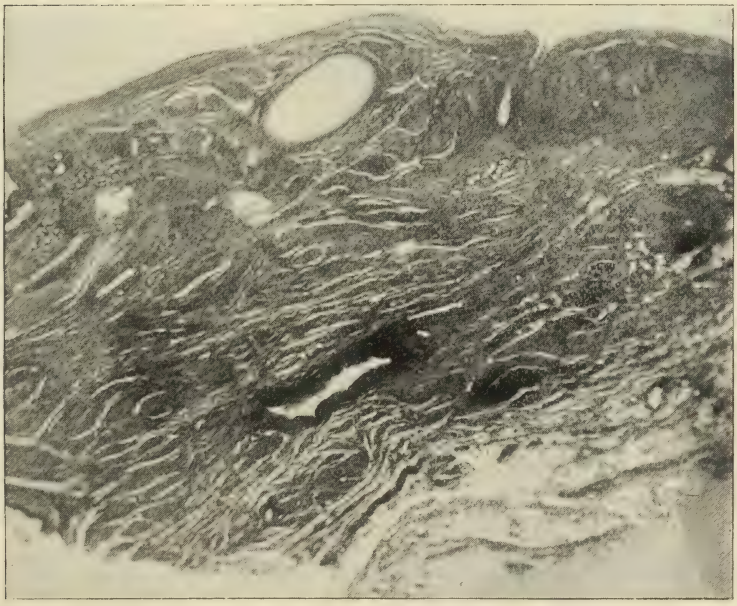
In deep-seated dermoids, a goodly portion of the growth is made up of bone and teeth, and these same structures are

Fig. 1.



Section through the wall of a dermoid cyst, including a mass of hyaline cartilage.

Fig. 2.



Section through wall of cyst, showing cartilaginous and glandular structure.

usually found in smaller proportions in dermoid cysts of the trunk, brain, face, tongue, scalp, or other localities where these growths are likely to be found. The teeth in dermoids are described as

Fig. 3.

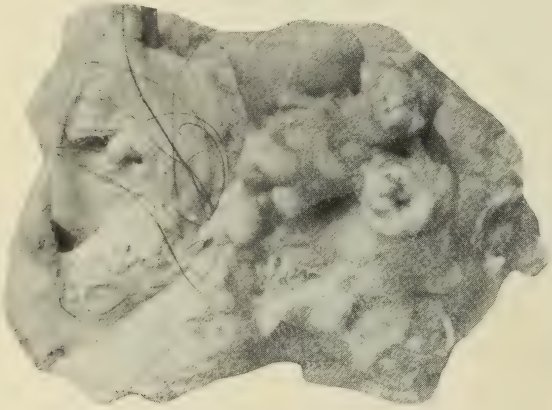
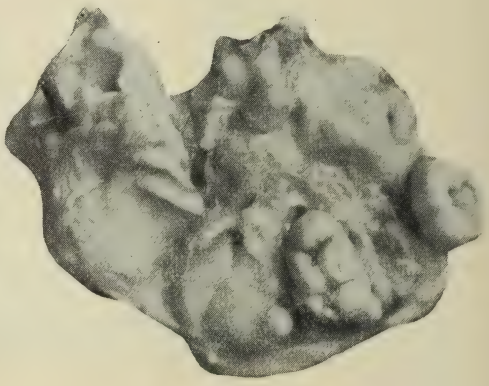


Fig. 4.



being made up of enamel, dentin, and cementum, resembling in every particular the same tissues in the teeth of the mouth; and in a measure this is correct, but the hard tooth tissues are frequently pathologic in many respects. Cementum is usually absent or but slightly developed in those teeth without bony surroundings.

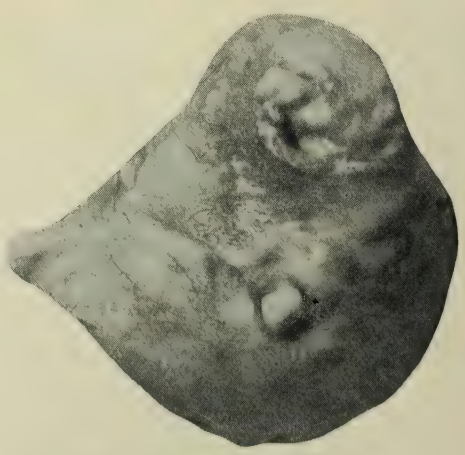
No doubt some of the teeth of dermoids develop during childhood or at a time corresponding to first dentition; some are developed during the period of permanent dentition, while others appear in later life.

The principal cyst upon which these dissections were made was unusually large, and was removed from a woman about twenty-six years of age. (Figs. 3 and 4.) It weighed between fifteen and eighteen pounds, and contained connective-tissue products in the shape of bone, cartilage, dentin, etc., epithelial products such as hair in abundance, enamel, sebaceous glands, sweat glands, besides accumulated secretions from these, which added much to the weight of the tumor. In this cyst the teeth were too numerous to count; in fact, an effort to expose them all would have resulted in the complete destruction of the soft parts, and as it was desired to keep these in contact for further study they were left undisturbed.

Other and smaller specimens studied were taken from the face and scalp, and proved of equal interest.

Dermoid cysts of the mouth are usually found in the hard and soft palates.

Fig. 5.



Dermoid cyst from the hard palate. Slightly enlarged.

(Fig. 5.) In the former they are infrequent, but when present are inclined to be extremely complicated in structure, while those of the soft palate are of the simpler variety. In size, palatal dermoids vary from the size

of a pea to that of a hen's egg, the larger ones usually being pendulous. Besides the palates, the floor of the mouth is sometimes the seat of a dermoid cyst, the dorsum of the tongue serving as a point of attachment. When teeth are present—as they are apt to be in any of these tumors—the location of the growth appears to have little influence over either the macroscopic or the microscopic character of the organ.

Teeth of dermoids present a variety of form, and range from the simple cone-shaped crown to those which are multicusped and very complex. (Fig. 6.) The crowns of these teeth are often remarkably well formed, some resembling molars, some bicuspids, while others are of the simpler type. They are usually small in size, and their roots are seldom well developed, and are usually not fully calcified, perhaps are partly decalcified. The enamel in most complex teeth in dermoids fails to unite between the various centers of calcification; the developmental grooves are therefore deeply sulcate and imperfect. (Fig. 7.) The enamel in some instances is smooth and glossy, but most frequently it presents an unfinished pitted appearance similar to that of the enamel of teeth in the mouth showing the effects of perverted nutrition.

As before stated, it is the usual order to find the root-apices of the teeth of dermoid cysts to be more or less incomplete, resembling young oral teeth in which the process of calcification is incomplete. (See Fig. 6.) This condition never appears in the form which would result from resorption, but it shows the result of a physiologic action either in the form of incomplete calcification or partial decalcification. If the latter, the question arises, Do the roots of these teeth decalcify through the activity of a persistent vascular papilla? —a question which so far as the writer is concerned must for the time being remain unanswered. When we consider that certain retrogressive changes take place in the structure of a dermoid cyst, we may look for a degenerative metamorphosis in the teeth of such cysts. There is a fatty degeneration of the epithelial cells so pronounced in many instances that the contents of the cyst take on an oily character. The hair falls out and becomes suspended in the liquid contents, and besides this, from the entrance of certain pyogenic organisms, inflammatory areas exist which are destructive to the sac and its contents.

FIG. 6.

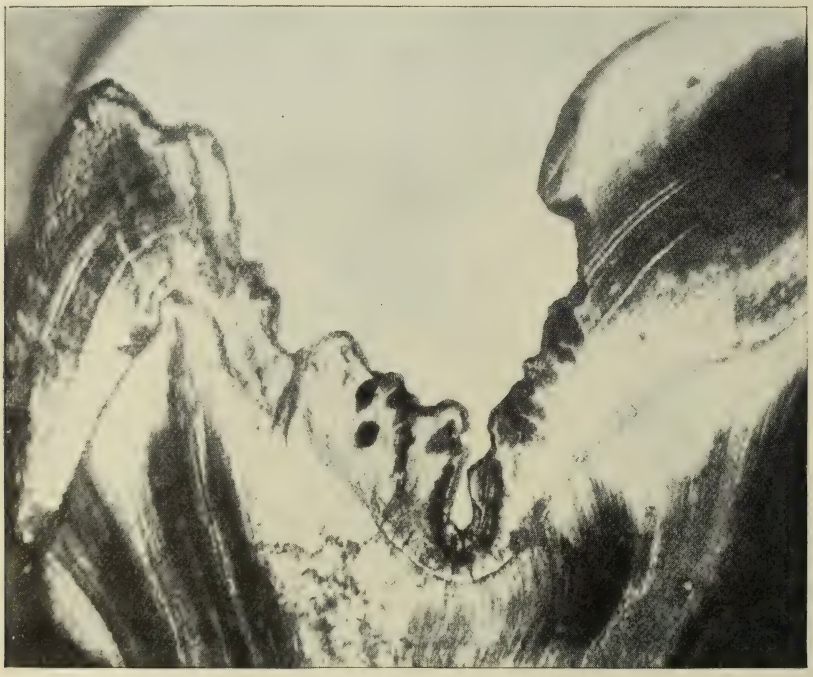


These facts being taken into consideration, it is quite probable that the tooth tissues are affected, first, perhaps by the physiologic absorption, which corresponds to the shedding of the hair, and second by a pathologic process occasioned by inflammation and suppuration.

There appears to be a slight disposition for pathologic growths, in the nature of odontomes, in connection with the teeth of dermoid cysts. There is in some instances a slight secretion of fluid between the walls of the follicles and the surface of the developing teeth, in a measure resembling a follicular odontome; but there is no pronounced distention of the sac, therefore this can scarcely be classed as a definite tooth-tumor. The roots of these teeth are frequently the seat of tumor-like growths, which are the result, no doubt, of an aberration of the dentinal germ, and therefore may be classed as radicular odontomes. Occasionally the hard tooth tissues are present in such a conglomerate mass that they closely resemble composite odontomes, and indeed they may be justly included in this category.

The assertion has been made that in the long slender teeth of dermoids a definite pulp-cavity is not present. To this theory we are compelled to take most emphatic exception. If this were true, we would of course have to look for a special mode of generation for the dentin. To refute this theory, very many ground sections were made upon teeth of this type, and in not a single instance was a definite pulp-canal wanting. Certain it is, that at one time all of these teeth possessed a central pulp, following in turn upon the dentinal papilla. The arrangement of the tubules, even in those few instances in which there was but a trace of the pulp-canal, is such that they could not possibly have been developed

Fig. 7.



Section through tooth of dermoid cyst, showing incomplete condition of developmental groove.

in any other manner. In one instance the center of the root of a long slender tooth was made up of a mass of bone-like dentin resembling osteo-dentin. This was peculiar and interesting, but no doubt marked the location of a mass of abnormally calcified pulp-substance.

Fusion. Twin or geminous teeth are not infrequent in the teeth of dermoid cysts. (See Fig. 6.) This fusion takes place without inflammatory conditions of the root-membrane, and therefore may be classed as true gemination. Such teeth seldom have a bony surrounding and are contained within a single follicle, which may, however, possess secondary sacs within. The respective tissues are united more or less completely, but unlike the geminous teeth of the mouth the union does not take place through the cementum, which, as has been said, is wanting in most instances.

The principal interest in the study of the teeth of dermoids lies first in their mode of development, and second in the structural formation of the hard tissues as compared with the normal tooth tissues of the mouth. It has already been stated that the time at which these teeth begin to grow is variable, because they are more or less completely formed and calcified in cysts taken from quite young children. On the other hand the writer has been able to observe tooth-germs which correspond in most respects to those of embryonic life, present in the substance of these cysts in patients of advanced years, showing conclusively that the process is by no means confined to any particular period. While this is true, the process of tooth-formation is most prolific during the years of normal dentition. In order to establish the belief that the process of tooth-formation in these growths was more or less continuous, section of a portion of a tumor was made in the region of some formed teeth. After numerous attempts, developing teeth were found in which the process of calcification had barely begun. (Fig. 8.) Differentiation in the surrounding cells had not taken place to

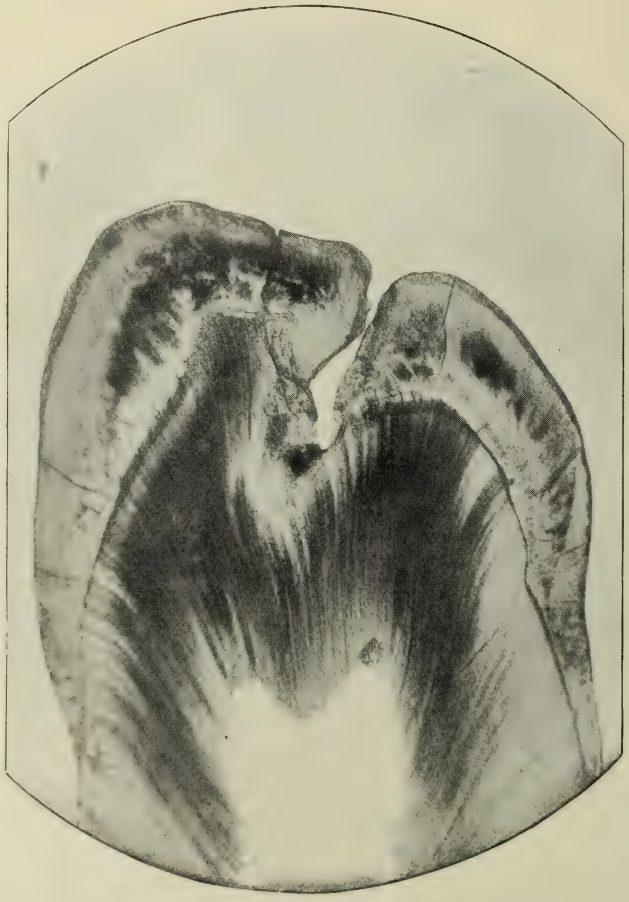
FIG. 8.



Calcification of dentin taking place in forming tooth.

the extent of forming a separate follicle, but this undoubtedly would follow in due time. Efforts were made to trace an epithelial cord leading to the surface epithelium, but this could not be found. The cyst from which these dissections were made was taken from a man of about thirty-four years of age.

Fig. 9.



Microscopic appearance of dentin and enamel.

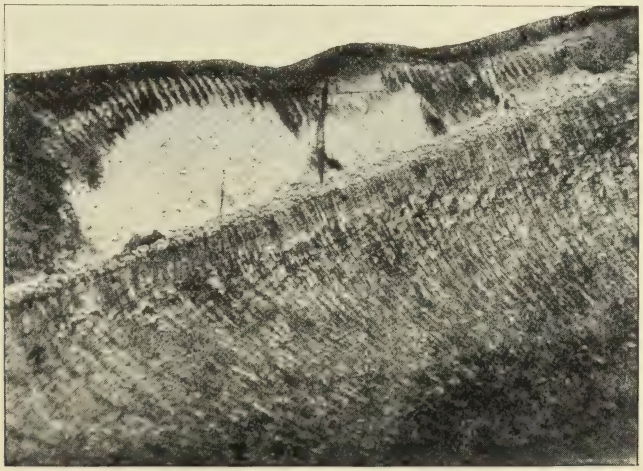
An investigation of the tooth-germs of dermoids presents a striking likeness to those of ordinary teeth. The enamel organ is composed of the same characteristic epithelial layers, although the cells are not nearly so regularly placed, a feature which undoubtedly has a controlling influence over the make-up of the calcified enamel in complex teeth, which, as we shall see, is dissimilar to normal enamel in certain cases. The dentinal papilla is extremely vascular, and the primary odontoblastic layer is frequently interlaced, so to speak, with the inner tunic of the enamel organ, another feature often recorded by a peculiarity in the dento-enamel junction to be spoken of later. It is a difficult matter to determine in a limited time the nature of the calcifying process in these teeth, but this is undoubtedly the same as that which builds up the hard tissues of the teeth of the mouth.

Bland-Sutton makes the remarkable statement that "many ovarian tooth-germs lack a definite follicular wall or

sac." Dissections upon a number of such cysts have failed to reveal such a condition to the writer; in fact, the follicular nature of these teeth is most pronounced. The follicles differ from those surrounding normal teeth-germs only in the character of their walls, and this difference is exactly what might be expected; that is to say, in those teeth developed with bony surroundings two distinct layers are present, while in those teeth not thus located but a single layer is present.

but in those teeth which may be classed as multi-cusped or complex, the roots are tortuous to an extreme. As to the development of this tissue, we venture the opinion, based upon a careful study of all the parts concerned, that this is more or less a continuous process. It is doubtful if these teeth ever actually erupt, and as they do not, there is no rupture of the enamel organ, this persisting as a caplike covering to the tooth-crown, and in a measure retaining its function. In the same manner, and for

FIG. 10.

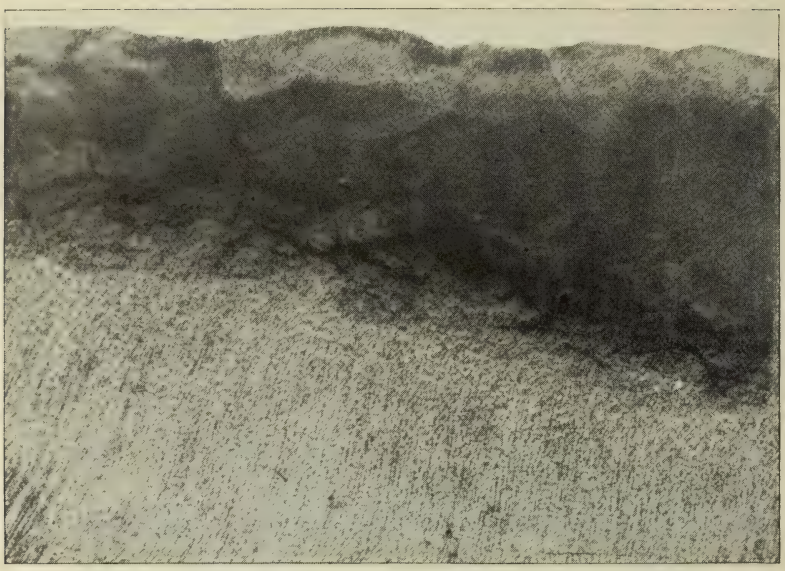


Peculiar pigmentation of enamel.

Enamel. (Fig. 9.) No chemical analysis of this was made, but we believe it to contain a greater proportion of organic material than normal enamel, arriving at this conclusion through observing the action of the decalcifying fluid upon it, as well as the ability to make ground sections with little or no tendency to fracture. A careful study of the enamel has brought the following results: It is devoid of a definite cuticle. In most if not in all instances pigmentation is pronounced, and without regard for location or order. (Fig. 10.) In the simple cone-shaped crowns, where the enamel is well formed, the enamel rods are distributed in a uniform manner, the same reason, we might presume to understand why the enamel of so many of these teeth fails to unite at the developmental grooves; and this can scarcely be considered a pathologic, but rather an unfinished or incomplete process.

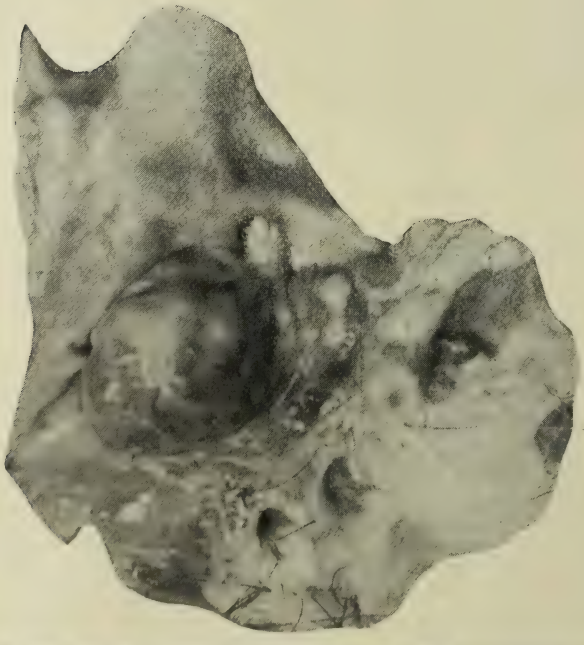
A condition which, so far as the writer is aware, is peculiar to the hard tissues in the teeth of dermoids is the character of the dento-enamel junction. (Fig. 11.) While this often appears as it does in normal teeth, in very many cases the two structures seem to be fused together, the fusion being so pronounced that it is extremely difficult to determine where the dentin ends and the enamel begins. In the formation of such a peculiar condi-

FIG. 11.



Section showing dento-enamel junction.

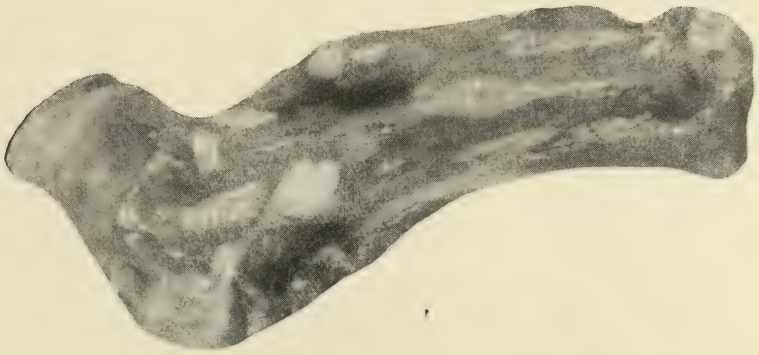
FIG. 12.



Mass of bone taken from interior of cyst, and supporting a secondary cyst in which many teeth are confined.

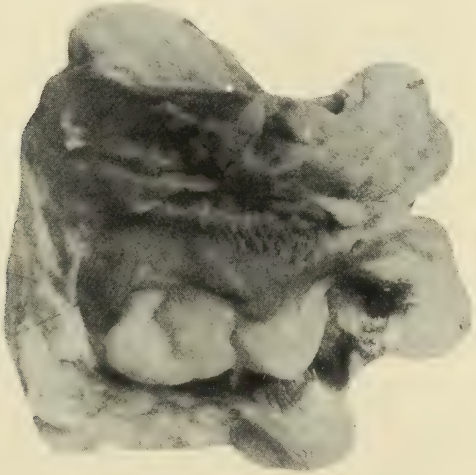
tion, the ameloblasts and odontoblasts must be very closely associated, and their characteristic primary and secondary curvatures, with their club-like endings

FIG. 13.



A portion of bone taken from interior of large cyst, and supporting two teeth, one imbedded in a complete alveolus, and the other held in place by mucous membrane.

FIG. 14.



Section of cyst containing teeth surrounded by gum tissue.

activity as agents controlling the process of calcification must be simultaneous.

Dentin. In a general way the dentin in these teeth does not differ from that of normal teeth. If a ground section be made of a regularly formed tooth taken from a dermoid cyst, it would be difficult to discover any marked histologic variation in structure. The arrangement of the tubules is the same, presenting the in the periphery of the tissue forming a slightly granular zone at that point.

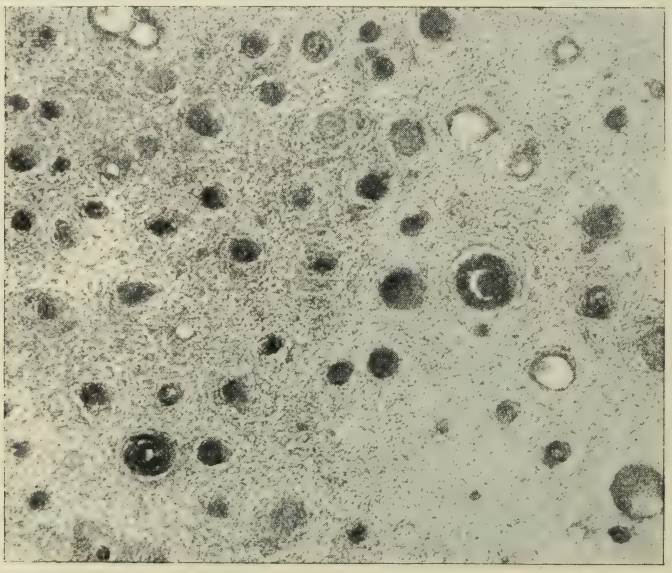
The interglobular spaces are larger proportionately, and perhaps more numerous. In ill-formed teeth—those with their crowns and roots more or less twisted and complex—there is necessarily an intricate arrangement of the cell elements not only in the substance of the dentin, but also in that part closely associated with the pulp. At the line of

junction or fusion in geminous teeth the arrangement of the tubules is most complex and forms an interesting study, twisting in and out, crossing and apparently anastomosing, resulting in a structure highly organized, resembling osteodentin.

Cementum. It has been stated that in many instances cementum is wanting. Bland-Sutton says, "The amount of cementum varies. In many specimens it is entirely wanting." The writer has observed that it is never present in those teeth without bony surroundings, or minus an aveolus, but is usually present to a slight degree in teeth surrounded with bone. Functional activity, which is essential to the establishment of a thick layer of cementum in teeth in the mouth, is, of course, absent in the teeth of dermoids, and therefore there are but few lamella present in the cementum of these teeth. In the majority of instances, teeth with bony surroundings—and these are not numerous—possess a layer of cementum made up of the granular ground-substance, with but few generative cells and no cemental fibers. This being true, the histologic study of the cementum in the teeth of dermoids is necessarily limited.

Pulp. (Fig. 15.) The pulp tissue in the teeth of dermoids is rich in cellular elements and remarkable for vascularity. In teeth of the mouth the pulp-cells are widely separated, floating about, so to speak, in the protoplasmic-like substance without apparent function. In the teeth of dermoids the cells of the pulp are so closely associated that they appear to form a fibrous-like structure. Besides this, they arrange themselves in a concentric fashion about the numerous bloodvessels and nerves. The odontoblasts are surrounded by a layer of multinucleated cells, which assist in making the tissues considerably more complex than the pulps of normal teeth. The distribution of the bloodvessels and nerves is not only generous, but nearly equal through all parts of the tissue, the periphery of the pulp presenting no greater vascularity than the central portion.

Fig. 15.



SOME THINGS ABOUT ALLOYS NOT GENERALLY UNDERSTOOD.

By M. L. WARD, D.D.Sc., Ann Arbor, Mich.

(Read before the Pennsylvania State Dental Society, at its annual meeting, Philadelphia, June 28, 1905.)

IT is not without reason that the eyes of the whole profession have been fixed attentively upon the subject of amalgam since its introduction as a filling material about a century ago. A liberal review of the literature reveals that it at once attracted the attention of all—the one, but smaller, part of the profession adopting it and the remainder condemning it. As crude a product as it was then, its use continued to grow, principally through its one specific merit, viz, that of easy insertion. There are still sections of the country where this and similar conditions have not materially changed, as becomes evident by as careful and persistent a study of the subject as I have pursued for the past two years.

The impetus given the subject by its earliest advocates was soon renewed by more enthusiastic ones, who kept it constantly before the profession till the long-to-be-remembered investigation by Dr. G. V. Black in 1895-96. He proved beyond doubt that many of the alloys made previous to his work were in the range of greatest shrinkage, and contained large quantities of the two constituents—viz, copper and tin—which in conjunction with this shrinkage were largely responsible for the extreme discoloration of tooth-structure that accompanied the use of these alloys.

The history of the hard alloys dates no farther back than Dr. Black's work; let this be thoroughly understood. Articles appear in our journals as late as January 1905 with quotations from Taft's "Operative Dentistry" and from Dr. A. J. Bennett's article in the "American System of Dentistry," to show that gold is superior to amalgam as a filling material, while nothing definite was known about amalgam and no one had approached definite results till Dr. Black did his work in 1895-96. These two men were prominent in the profession and very proficient in other lines of work, but what did they know about amalgam alloys? Why should their work be used as references at this late day? Farther on in the same article we read: "Still, we have little evidence that the alloys now in use are very greatly superior as tooth-preservers to those of many years ago, which were so objectionable on account of discoloring the teeth." I ask of these men to begin with the new epoch in the history of amalgam and study it carefully and diligently before making such statements about a material which, while admittedly inferior, is certain to occupy a prominent place among our filling materials.

As a result of Dr. Black's work the alloys furnished us today are divided into two classes. There are but comparatively few made now that do not fall into one of these classes. It is far from the wish of Dr. Black that this should be true; in fact, but few of the men that are making the better class are making them as he would have them.

The first class is that of the hard alloys, composed of from 65 to 68 per cent. of silver, 26 to 28 per cent. of tin, 3 to $4\frac{1}{2}$ per cent. of copper, and 1 to $2\frac{1}{2}$ per cent. of zinc. All of the best hard alloys fall within these ranges, and are not made from any given formula—a fact which, if thoroughly understood by the profession, would retard the progress and in time obviate the use of alloys made from some pet formula by some silver-

smith or other person equally as limited in his knowledge of the subject. From this class rapid, medium, and slow-setting alloys are made, though the "slow" ones are much faster than the plastic alloys. These alloys are sufficiently plastic when properly annealed. The small amount of movement accompanying their amalgamation and setting is all expansion. They give up their excess of mercury comparatively easily. Their color is good. They are the only ones that are stiff enough to remain where they are packed and not change their position with the subsequent movements necessary to complete the filling. Their flow is comparatively little, their resistance to crushing stress is great. Close observation accompanied by common honesty should have been sufficient equipment to enable the profession to eliminate from the market entirely everything but the best of this class of alloys long before this. But instead of mastering the one objection, apparently the only one, viz, the hard working property, many of the profession cater to their personal likings, and regardless of the magnitude of the error, demand the soft, plastic alloys, which we will refer to briefly for comparison.

The composition of the soft alloys is based upon the short shrinkage and expansion range of 50 parts silver and 50 parts tin. The silver in these alloys ranges from 43 to 48 per cent., the tin from 48 to 58 per cent., and the zinc from 1 to 2 per cent. Most of these alloys are possessed of the dual movement —viz, both shrinkage and expansion. It must not be understood that the shrinkage and expansion are both going on at the same time. The shrinkage occurs first, and usually within twenty-four hours, while the expansion does not begin till the second or third day. Even though the shrinkage which occurs during the first twenty-four hours is all made up by a subsequent expansion, the borders are never where they were before these movements took place. These alloys retain great excess of mercury because of their stickiness, and this excess at body temperature results in a continued crystallization lasting for months and years. Their flow is from five to ten times that of the hard alloys, which enables the continued crystallization to produce the protruding borders now so often seen, and, in the four-walled cavities such as are found on the buccal surfaces of the teeth, the typically spheroided fillings which will be referred to later. Their resistance to crushing stress is very low; they cannot be packed to make a good filling. Any effort to condense one part results in a movement in another, because of their softness. They are all very slow-setting alloys. Rapid and medium-setting alloys cannot be made from this class. The quick-setting properties diminish quite rapidly as we leave the ranges given for the hard alloys and are almost lost before this class is reached, and as a result we have a mass that requires much time to stiffen sufficiently to admit of the manipulation necessary to complete the filling without its being distorted.

I think the conscientious and conservative men in the profession will no longer insert this latter class of alloys when they understand that with the same effort on their part, with no greater expenditure of money, and with the same ease to their patients, they can save more teeth and have better-looking fillings. The great trouble is, and has been for years, that the properties of amalgam alloys have not been clear to the minds of men generally. It has been necessary for them to accept the articles in our periodic literature, many of which are similar to those I have just mentioned.

Probably not five per cent. of the profession understand that *silver* is an expanding constituent, that because of its affinity for mercury and its crystalline form it controls the setting, that it improves the color, increases the edge strength, lessens the flow, and because of its great tendency toward crystallization and its property of uniting with mercury slowly at ordinary temperatures it causes the alloy to work hard.

The same lack of understanding is

true in the case of *tin,* which unites with mercury in all proportions and at all temperatures, forming a weak crystalline compound if crystalline at all; it is not understood that it produces shrinkage, retards the setting, reduces the edge strength, increases the flow, and is used simply because it imparts plasticity in a weak or non-crystalline form.

Copper unites with mercury with difficulty, tarnishes readily in the presence of moist air and sulfuretted hydrogen, but it diminishes shrinkage, hastens setting, increases the edge strength, and lessens the flow.

Zinc unites with mercury in atomic proportions, tarnishes slowly, controls shrinkage markedly, hastens the setting, improves the color and edge strength, and lessens the flow.

I think that if the profession understood that these properties of each constituent stand out markedly in their alloys, as is usually the case with solutions or mechanical mixtures, they would no longer resort to alloys with less than 65 per cent. of silver in them. It is this lack of general understanding, caused by secrecy on the part of those in possession of the knowledge of the properties of alloys, that keeps a large percentage of the profession demanding the soft plastic alloys, which the manufacturers know very well do not compare with their hard alloys, composed of higher percentages of silver. But what can they do when they are simply supplying the demands of an uneducated public?

Many of the hard alloys as furnished us now may be found in three classes—viz, the rapid, medium and slow-setting. The difference in these three classes is in the annealing; there is little or no difference in composition. Regardless of the claims of some of the manufacturers that all of their alloys are carefully annealed and the movement accompanying their amalgamation and setting does not exceed one ten-thousandth of an inch expansion, I will show you that this is true only in the earlier stages of crystallization or with their slow-setting alloys. If these alloys are subjected to a test of six months or longer at body temperature, it will be seen that there is a marked difference between rapid, medium, and slow-setting alloys in the amount of expansion that takes place. It will also be noticed that at the time of amalgamation there is a marked difference in the amount of mercury required to make a plastic mass of each. For testing this I have two thermostats running all the time, one set at room temperature and one at body temperature, and no test is regarded as final that has not been in both of these from fifty days to six months; and often at the end of this time changes are found to be going on.

For illustration I will give you the final results of some of the tests upon one of the hard alloys that was kept seventy-five days in the thermostat at 21°C. The alloy was cut on a lathe with an automatic micrometer adjusting feed, so that I probably had as uniform a cut as could be obtained. (See Figs. 1 and 2.) The test tubes were 5-16 in. in diameter and 5-16 in. high. The alloy was made in an electric furnace supplied with modern conveniences for preventing oxidation. The stirring and casting were done under very favorable circumstances and in accordance with methods advocated by expert metallurgists. There was undoubtedly little or no chance for error in the preparation of this ingot. The mixing and packing were done as I have described in another part of this paper, except that the mercury was added from a small jug which had been previously weighed. (See table, page 1426.)

First, let us notice that the movement accompanying the amalgamation and setting of this alloy was all expansion—as is always true with the best of these alloys. Shrinkage is not a phenomenon accompanying the use of the best of this class, if they are properly manipulated. The sloppiest manipulator among us probably could not make one of them shrink, though it is possible that a slight shrinkage might be produced.

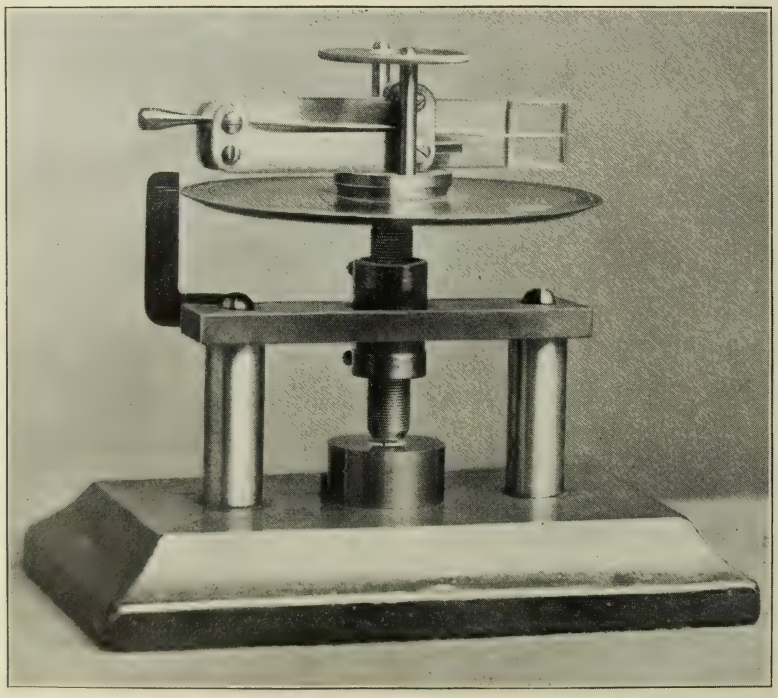
Second, let us notice that this expansion is practically all removed by the an-

nealing, thus insuring a product whose movement is reduced to a minimum, not ing is continued. I do not mean to infer that the quick-setting properties are all

Formula.	Test No.	Time of annealing at 43° C.	Percentage mercury.	Points of expansion.	Manner of setting.
Ag 67.75	1	none.	60.00	23 points.	Extremely rapid.
Sn 27.50	2	1 day.	55.50	7½ "	Slower than No. 1, but quite rapid.
Cu 3.40	3	2 days.	53.41	4 "	Slower.
Zn 1.35	4	3 "	53.00	2 "	Slower.
	5	6 "	52.89	1¾ "	Slower.
100.00	6	10 "	51.76	1 "	Quite slow, but faster than the plastic alloys.

exceeding in the earlier stages of crystallization at ordinary temperature, lost by the annealing, but that the extremely rapid-setting tendency is what

Fig. 1.



Amalgam micrometer. (See also Fig. 2.)

1-10,000 to 2-10,000 of an inch on a block of amalgam 5-16 in. in diameter and 5-16 in depth.

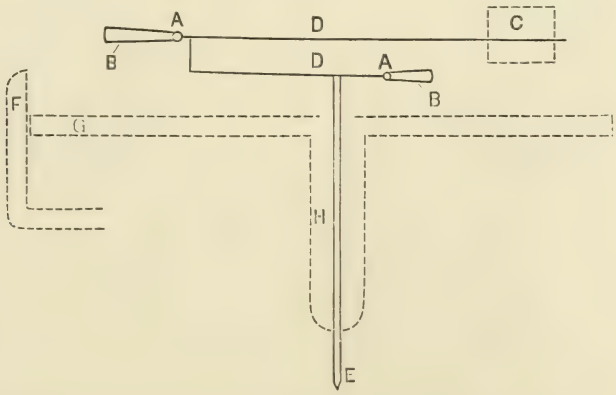
Third, let us notice that the rapid-setting properties are lost as the annealis removed. When these alloys are fresh-cut it is almost impossible to make a plastic mass of them; though as much as 60 per cent. of mercury be used they are still dry and granular, and stiffen at the

very moment they lie still. With each day at room temperature, and each hour at higher temperature, the quick-setting properties are lost, until we have an alloy that sets quite slowly, though not as slowly as the plastic alloys.

Let us bear in mind, then, that the difference in annealing is what produces the difference in the setting properties, and that this annealing occurs at room temperature as well as at higher ones, only it takes a longer time. If, then, you are buying rapid-setting alloys in large quantities, you should not be surprised to find the last bottle setting much slower than the first, unless you have kept it in a very cool place. Much stress is laid upon the proper amount of annealing by some of the manufacturers. By this they claim to get an alloy that always gives an expansion not exceeding 1-10,000 of an inch on their rapid, medium, and slow-setting alloys, while if you refer to the chart you would find that test No. 2 would have compared quite favorably to some of our hard alloys, marked "rather rapid-setting," etc., and No. 5 just as favorably to one of our hard alloys marked "slower-setting," though there is quite a difference between the two in the amount of expansion that took place and the percentage of mercury required to make a plastic mass.

Again, let me remind you that these good hard alloys do not shrink. It is a question of how much expansion takes place and how quickly they set. Let me show you the results of time on some other alloys. Some time ago I asked what alloys a certain dealer handled and of which he sold the most. He responded with the usual reply that he sold one hard alloy and one plastic alloy, but kept in stock a number of others. The ones he kept in stock had been in his possession a long time. The ones he sold the

FIG. 2.



A A represent two jeweled bearings from which swing the two levers D D. These two levers are counterbalanced by the two adjustable counterweights B B, which enable one to bring the instrument into contact with the filling at E with a minimum amount of pressure upon the filling. As these levers are *small* steel needles, this amount is very small when the counterweights are adjusted, and at the same time allows one to use very long levers, which is a decided advantage. C represents a small mirror in front of which swings the longer lever D, which must coincide with the fine line across the mirror every time a reading is taken at the vertical bar F. This vertical bar is ground to a knife-edge, so that it easily falls upon or between the graduations on the disk G. The bar also contains graduations which are the same distance apart as the threads on the micrometer screw H, thus enabling one to tell at a glance how many turns the screw has made.

most of were fresh because his supply was being constantly exhausted and as often replenished. An analysis of the alloys in his stock seemed to cover the field fairly well, as will be seen by the following table:

Alloy No.	Ag.	Sn.	Cu.	Zn.	Gold.	Expansion.	Average shrinkage.
1	43.21	56.68	. .	0.09	. .	. .	10 points.
2	45.64	53.14	.15	1.10	. .	. .	2¾ "
3	46.85	52.17	. .	0.98	. .	. .	8¼ "
4	48.61	50.04	. .	1.55	. .	2	. . . . .
5	43.44	50.51	3.41	2.64	. .	. .	½ point.
6	54.08	39.92	2.56	. .	. .	0	0
7	58.07	34.93	3.46	2.54	. .	. .	½ point.
8	66.19	27.23	4.12	2.46	. .	1½	. . . . .

Let us notice that they all shrank from one-half point to ten points on the micrometer except Nos. 4, 6, and 8. Nos. 4 and 8 were the ones he handled the most of. They were both fresh. No. 6 we happened to catch at zero point. These alloys were now placed in a thermostat, which was set at about room temperature (38° C.), and left there six months, when these tests were repeated. At that time Nos. 2 and 6 had gradually crept into the shrinkage column, leaving No. 8 the only one to give the slight expansion necessary to insure against shrinkage. Nos. 4, 5, and 6 were not capable of great shrinkages, and it is barely possible that these slight shrinkages were due to the manipulation, but it will be seen that the percentage of silver in all three of them was below 55 per cent.—a fact which alone is sufficient to condemn them. This analysis of this dealer's stock shows that these low-grade alloys are still made and that many of the profession are using them.

The amalgamation of this class of alloys is best accomplished with weighed proportions of mercury and alloy. It may appear a feeble and prove a fruitless effort for me to advocate what Dr. Black has advocated for ten years, but it is nevertheless true that this is the only way in which to get uniform results. These proportions will vary with the alloy used and the age of some of the alloys, as has just been shown. The amount of mercury for these alloys is generally greater than the alloy, ranging in most cases from 4 parts alloy and 5 parts mercury, to 5 parts alloy and 7 parts mercury. After weighing the alloy and mercury they should be placed in a small mortar and stirred rapidly but lightly with a pestle until the two are coherent enough to be turned into the hand conveniently. Much force should not be used in the mortar, lest the identity of the "cup" be entirely destroyed. This should be a means of incorporating the two without loss of material or waste of time, and *not* a means of comminution. I firmly believe that the alloy may be much more uniformly dissolved in the mercury by a continued rapid kneading in the hand than by grinding in a mortar. After some careful study of this subject I found that unless the grinding process, as done with the mortar and pestle, was carried on for a long time and much care used in keeping the borders well shaken into the middle of the mortar, a section would show patches of what appeared to be a complete solution of the alloy in the mercury, among which were granules of the alloy that had not been half dissolved.

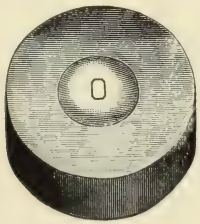
After incorporating the alloy and the mercury in the mortar, they should be turned into the hand and kneaded rapidly until the granulations have quite uniformly disappeared. If during the kneading the mass becomes quite soft before the granulations disappear, the surplus mercury should be removed by

gently squeezing the mass between the thumb and finger. Do not use much force, otherwise you will press too much mercury from the center into the border of the mass. Do not take the time to place the mass into a chamois skin or muslin unless you have a mass too large to be uniformly compressed between the thumb and finger, because the alloy will stiffen so much that subsequent kneading will not produce the required plasticity.

portions of mercury and alloy should use great care not to add mercury from a jug till large globules of mercury can be removed with little effort.

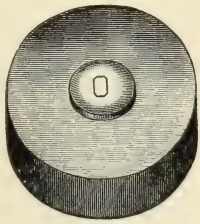
As soon as enough mercury has been added to make the mass coherent enough to hold together, the kneading should be begun and mercury added very slowly till a point is reached where, after vigorous kneading, a very small globule of mercury may be removed. This is the

Fig. 3.



A

Fig. 4.



B

Surface of amalgam fillings, showing the spheroiding phenomenon. A, cavity with rough walls. B, cavity with polished walls.

After removing the excess of mercury, the mass should again be returned to the hand and kneaded vigorously. If the mass again becomes too soft, more mercury should be removed as before. It is usually necessary to return the mass to the hand three or four times, each time removing a *little* mercury, to get the "creaking noise," which indicates the amount of stiffness necessary to enable it to be properly packed.

It must be understood that "weighed proportions of mercury and alloy," does not mean the amount of mercury which should be left in the filling, *but* the amount which should be used to amalgamate the alloy; it is the amount of mercury which after being incorporated with the alloy in the mortar and thoroughly kneaded in the hand will allow us by good firm pressure between the thumb and finger to remove a very small globule of mercury, and after more vigorous kneading in the hand will allow little or no mercury to be removed with the same pressure as was used the first time. Those who are not using weighed proway the proper proportions are determined, and it should be observed closely by everyone for reasons which will be given later under the head of "constituents removed with excess of mercury."

The packing should be begun at once, using as much force as is consistent with the operation, and such large, flat-ended instruments as will conveniently enter the orifice of the cavity. If the cavity contains angles or irregularities, as large an instrument should be used as will compress the amalgam into such an angle. Dr. Black says the whole principle of making perfect work is contained in the one word *compression*. This class of alloys all have a tendency to stiffen if they lie still for a few seconds. It is this property that enables us to pack them so much better than the plastic alloys. After the amalgam has once been carried to place, it should not be moved again by any means whatever. Any subsequent movement of the mass will produce a weaker filling. The amalgam must lie still after it has been packed.

The use of the matrix is imperative.

It is impossible to get any degree of compression in a cavity that does not contain four natural or artificial walls. There is no one thing that will so disgust you as to study carefully the borders of your amalgam fillings with even a low-power lens. Expert manipulation, attended by the most discriminating care, will not produce a border on an amalgam filling that is as good as a gold filling that has been made under anything like as favorable circumstances, while an amalgam filling which has been made without a matrix and under other less favorable circumstances is not deserving of comparison.

With amalgam, as with other plastic fillings, the cavity should be filled more than full and left so until it has stiffened sufficiently to admit the necessary carving without movement of the mass. The finishing should be the same as with a gold filling, and should be done every three or four months because of the expansion that is constantly going on with our present alloys unless care has been used in selection of the alloy and the percentage of mercury used to amalgamate it.

An understanding of the merits and manipulation of the hard alloys should be general. The use of the so-called gold and platinum alloys, the plastic alloys, Dr. So-and-so's special alloy, the use of the round burnisher for packing, filling approximal cavities without a matrix, the washing of alloys, the discoloration of tooth-structure, and the manufacture of one's own alloy should be matters of history and no longer material for discussion at dental meetings. If I could preclude the sale of the plastic alloys, prevent dentists from making their own alloys, and nurture the thousands who have labored for years under an indifference and inattentiveness to this subject of manipulation, I would feel that I had exploited the most fertile field in dentistry and reaped a harvest that had been ripe a century.

There is a widespread belief that the composition of a given alloy may be markedly changed by the excess of mercury necessary to amalgamate it. Such, however, is not the case with the best of these alloys when they are *properly* manipulated. There is a change produced, but it is not a perceptible one in ordinary work. I recently made a study of this subject to determine whether or not the constituents carried out along with the excess of mercury were in the same proportion as they were in the alloy. The tests and the results on one or two of these alloys will be sufficient to illustrate what takes place. I purchased in open market one of the hard alloys that was very uniformly cut and had given good results when tested in the laboratory. It analyzed silver 65.59 per cent., tin 27.67 per cent., copper 4.39 per cent., and zinc 2.37 per cent. I saved the expressed mercury from fifteen fillings that I had inserted while using this alloy in my practice. These fillings were manipulated as I have previously described, using 47.25 per cent. of alloy and 52.75 per cent. of mercury; the excess of mercury was removed by gentle pressure between the thumb and finger. An analysis of this showed the silver, copper, and zinc to be within 0.01 per cent. of what they were found in the alloy, and the tin to be in excess of what it was in the alloy by 0.32 per cent. From this same alloy I made seven fillings in the laboratory, using 55 per cent. of mercury. Each one was stirred rapidly in a mortar for one minute and kneaded vigorously in my hand for four minutes. You will notice that this was too much mercury and kneaded entirely too long with this excess of mercury that made it sloppy, but I was now making a special effort to dissolve greater proportions of the alloy if possible. The excess of mercury this time was removed through a strong piece of fine muslin, using about all the force I could exert. An analysis of this showed the silver, copper, and zinc to be within 0.2 per cent. of what they were in the alloy, and the tin to be *in excess* of what it was in the alloy by 1.01 per cent.

Still another test was made upon this same alloy, with the conditions exactly the same except that the excess of mercury was removed by heavy pressure be-

tween the thumb and finger. This time I removed larger percentages of all the constituents.

The tin in this case was in excess 3 per cent., and the silver lacking about the same amount, while the copper and zinc remained almost the same.

Another alloy that analyzed silver 64.39 per cent., tin 27.54 per cent., copper 4.47 per cent., and 4.60 per cent. zinc was treated exactly the same as the one just described, and gave practically the same results, viz, the silver was lacking 2.67 per cent., the tin in excess 2 per cent., the zinc in excess 0.34 per cent., and the copper about the same.

With these, as with my other tests, the proportion of tin that was removed with the excess of mercury has always been greater than it was in the alloy; the proportion of silver has always been less; the copper has always nearly equalled but never exceeded, and the zinc has always equalled and often exceeded.

These analyses indicate to a certain extent the selective power of mercury for each constituent, and show that with a large percentage of mercury, and excessive kneading with this percentage of mercury, we may produce marked changes in our alloy. We would naturally think, since tin is regarded as the shrinking constituent, that the removal of a greater or less amount of it would increase the expansion of the alloy. Such, however, is not the case. Shrinkage accompanies the removal of the tin every time; I have not found a single exception. This is the reason why we should work closer when we are amalgamating our alloys and not have large amounts of mercury to remove.

The so-called spheroidal tendency of amalgams has always occupied a place among the phenomena accompanying the use of amalgam sufficiently conspicuous to invite more or less lengthy discussions in our text-books and journals, and it attracts the attention of a great many even today. The prevailing opinion seems to have been, and is now, that the spheroidal shape of globules of mercury was due to some property peculiar only to mercury, and this property of the mercury was directly responsible for the spheroided amalgams. The fact has been lost sight of that other metals also are spherical when in a liquid state, and that the liquid state of mercury was simply a matter of temperature. Of the articles now on record I will refer to but two that seem to have any bearing upon the subject as it presents itself to me after a long and tedious study.

In the DENTAL COSMOS, vol. xxxvii, page 569, Dr. Black says that spheroided fillings may be due to an expansion of the mass; being confined by the cavity walls, the material will rise up in the center in the same manner as ice forming in a strong drinking-glass or other vessel will assume a spherical surface. This is because the ice flows under stress the same as amalgam flows under stress.

The second article may be found on pages 9 and 10 of a complimentary pamphlet sent out by the Garhart Dental Mfg. Co., which is a paper read by N. K. Garhart before the Odontological Society of Louisville, Kentucky. He says that "spheroiding or changing of form is nothing more than excessive shrinkage," and that "this condition of affairs is directly attributed to faulty manipulation of the alloy;" also that "Dr. Black could have given some valuable information on this subject had he submitted some spheroided fillings to a chemical analysis, because he could have proved the presence of surplus mercury." Notice that he says these fillings contain an excess of mercury, but that spheroiding is due to shrinkage. Hodgen says that of all the alloys tested by Dr. Black, he found but two which spheroided.

These statements would make it appear that the instances were very rare, and that there was still a variety of opinions as to the cause of the spheroiding. while I found scores of instances by some little observation in the mouths of patients whose dentists were using the plastic alloys, and in every case found the spheroiding to be due to expansion. Fig. 3 shows the surface of a filling made from one of the plastic alloys and kept in

the thermostat at body temperature for eight months. It may be seen that the surface is becoming spheroided. Fig. 4 shows a companion filling exactly like that of Fig. 3 except that the walls of the test tubes are highly polished, this being accomplished by making the test tube with removable bottom. It may be seen that the filling Fig. 4, instead of spheroiding, has risen as much at the borders as it has at the center of the filling. A number of tests made under the same conditions have shown that spheroiding was due to a roughness of the walls of the cavity. When this roughness was removed it would cause the spheroided surface to be substituted by simple expansion, as shown in Fig 4. The cause and extent to which these fillings expand appears to be dependent upon several factors, the elimination of some of which will retard the progress of the phenomenon, while the removal of others will prevent it entirely.

That these expansions are a continuation of the setting process I think there is little doubt. In every case where an excessive expansion or spheroided surface has been produced the amount of mercury used and the temperature at which the test was kept have determined largely the amount of expansion obtained.

These expansions are not obtained from all grades of alloys. Only those that retain great excesses of mercury and have a large percentage of the non-crystalline element produce them. This class I have already designated as the plastic alloys, composed of silver, tin, and zinc in the proportions previously given. From what evidence I now have I believe myself to be safe in stating that these expansions may be attributed to the property of these alloys to flow easily under the strain of crystallization, due to loosely or uncombined mercury in the tin acting with the aid of body temperature upon a partially crystallized alloy.

DEVELOPMENTAL PATHOLOGY AND TOOTH-DECAY.

By EUGENE S. TALBOT, M.S., D.D.S., M.D., LL.D., Chicago, Ill.

(Read before the Massachusetts State Dental Society at its annual meeting, Boston, Mass., June 8, 1905.)

THERE is a fascination about theories which exploit a single etiologic factor that carries away a large class of minds unaccustomed to analytic thinking and indisposed to intellectual exertion. For the same reason such theories are apt to be received with extreme skepticism by minds accustomed to analyzing the results of research. This last mental attitude is apparent among scientists of the dental profession in regard to the lactic acid theory of tooth-decay, so eloquently presented by Miller of Berlin.

The solution of the problem was too disappointedly simple. It bore ominous resemblance to many exploded one-sided solutions of etiology which have won the admiration of minds slovenly neglectful of analysis since inductive philosophy began to dominate. Like these exploded etiologic theories, the lactic acid theory had an attractive aspect and a superficial semblance of facts in its favor. Furthermore, it played to the sociologic reformer whose god is parsimony, by furnishing materials for an onslaught on candy.

The skepticism which the theory produced was strongly in evidence in remarks of Black and Truman in the discussion of Miller's paper at the Fourth International Dental Congress. The rule

governing the adoption of any working hypothesis is the simple, absolute one that it must not only explain all the facts but must exclude all other explanations. Unless this be the case, the hypothesis suggests no remedy capable of dealing with the results alleged to follow the conditions. Given an alleged simple cause which does not set in action secondary causes, or does not require predisposing factors for its operation, inevitably removal of such a cause must be followed by the cessation of its effects. This is particularly true where prophylaxis is so simple as in the case of the lactic acid theory. It is at least a quarter of a century since this theory was announced, yet tooth-decay continues its ravages, and is much more in evidence than ever.

The lactic acid theory in this respect closely resembles the germ theory as revived by Pasteur. At the outset of the revival, the germ was alleged to cause everything. Soon it was found that culture media were necessary for its operation, and furthermore, that the chief effects were due to toxins produced by the germ. The whole problem then resolved itself into the etiologic moment of the old clinicians. This etiologic moment consisted of the immediate determining factor, serving like a spark to a powder magazine, and the powder magazine consisted of the condition of the patient when born, affected by the development through which he passed, and finally by the condition in which he was at the time the spark was applied. Upon these last would turn his guards against disease determined by the state of his leucocytes and his antitoxin-forming organs.

What is true of the germ theory was true and is true of any theory by which a single etiologic factor is alleged. The viewpoint of this lactic acid theory at the outset is defective. It is true that children in civilization eat candy and their teeth decay rapidly, but it is equally true that the negro in the sugar plantation uses prodigious amounts of sugar-cane and sugar products, yet retains his teeth to old age. At the outset, therefore, the facts do not fit the theory, but indicate—granting everything that is claimed for lactic acid as an exciting cause—that there exist more potent causes of a predisposing character. The claim so often made that a given subject remains, despite all seeming hygienic neglect, with perfect teeth to an extreme old age may be granted, yet such an admission proves nothing, since it is notorious that one scion of a defective family gains physical health by the sacrifice of all the higher qualities of the race during the struggle for existence between organs waged with most intensity before adolescence is completed. The defective family generally contain a large number of scions dying at the various periods of stress in youth. A single selfish animal parasite is long-lived whose health is the result of his loss of higher attributes. The negro, like the ape, notoriously sacrifices the powers of higher development at the period of puberty to the necessities of food-getting and reproduction.

What is true of the negro and ape is true of all other races between the two extremes. The physical aspect of this sacrifice is shown in the sacrifice of the dermal bones that eke out the deficiencies of the skull and face formed from the chondro-cranium. Proper development of the jaws turns on the proper amount of dermal bone. If this be not furnished to the jaws, the brain and skull may profit but the teeth and jaws will lose. Proper development of the brain depends on development of the brain itself, not only in its powers as regards sensation and motion, but also in its powers of regulating growth and blood supply. If these last powers be interfered with, irregularities of dermal bone development result. Not only that, but proper innervation of the teeth and the bone will fail. The sacrifice of the higher gains of the race to jaw, teeth, and reproduction occurs early in the ape, whence the human aspect of the young gorilla as contrasted with the jowl and bestial face of the adult. In the negro the same thing occurs at puberty, but to a lesser extent. In higher races the same pu-

beral struggle for existence between jaws, face, and reproduction on the one hand, and the higher qualities, is observable.

The deciduous teeth, remarks Stanley Hall,* are more primitive in type, and the molars are useful in warfare, but suggest a change of food habits and involve greater length of jaw to make room for them, and greater strength of muscle. Hence, puberal increase of the lower jaw may be assumed. Increased prominence of the chin, breadth of the lower jaw, propensity to chew, to bite hard things, or to perform feats of strength with the teeth and jaws, the frequency with which clenching the teeth is mentioned in statistics as to anger, which shows a great puberal development of irritability, teach us how clearly jaw-tension, once a chief factor in battles, is still associated with pugnacity. One marked jaw-development of this pugnacity was the simian diastema for reception of the canines as used for fighting purposes. The space so used was gained at the expense of the teeth, and this diastema, loss of jaws, and space has persisted in man long after the use of the jaw for fighting has disappeared.

This constitutional factor of the periods of stress involved by the struggle for existence between organs, functions, and structures—pointed out by Roux† nearly a quarter of a century ago as a necessary corollary of the law of economy of growth‡ ruling use and disuse as a factor of development—plays the chief part in developmental pathology, as Demoor§ has lately shown and as was pointed out by A. H. Thompson.‖

Degeneracy or "suppressive evolution," as Thompson called it, is a part of developmental pathology which exerts beneficial or malign influences according as it attacks lower structures for the benefit of a higher or sacrifices the higher to the lower. Degeneracy may convert the third eye into a pineal body or may sacrifice the paired eyes to the third eye by creating a cyclops. It may sacrifice brain potentialities to the jaws and jowl as in the ape, or *vice versa* as in higher man. It actually sacrifices liver, kidneys, adrenals, brain, and eliminative powers to length of extremities. These factors, so well demonstrated and employed in medicine, are too much neglected in dental pathology, which deals with structures so transitory as to readily fall under their influence. The constitutional factor converting teeth from the megadont to mesodont and even to microdont types excellently illustrates this.

In lieu of the broad consideration necessitated by the results of modern developmental pathology, dental hypotheses are generally simple half-truths. Lactic acid in the system implies, for example, local imperfect oxidation and elimination; behind it must therefore lie arrests of development of eliminating and oxidizing organs. The same illogical tendency is apparent in other hypotheses.

While some admit that there is a diathesis, they do not believe that tooth-structure can be changed by health and disease through pulp and peridental membrane. Some believe that there is a difference in the "amount of lime carbonate and phosphate," thus causing a difference in "those salts that are more easily dissolved and those that are dissolved with more difficulty." Others argue that the teeth are degenerating, hence the body or race must degenerate as a whole. As statistics demonstrate that longevity is increasing from year to year, this cannot be true.

Another class think that direct heredity has something to do with tooth-decay, but are startled by finding that the parents of a child who has poor teeth have excellent teeth. Others argue that the aborigines lived upon coarse and simple food, while at the present day foods are prepared and of greater variety. This ignores the necessary changes of environment and the fact that the Scotch

* "Adolescence," vol. i. p. 77.

† "Der Kamp der Theil im Organismus," 1881.

‡ Goethe; Aristotle. "From the Greeks to Darwin."

§ "Evolution by Atrophy."

‖ Cosmos, 1877, vol. xix. p. 237.

have lived for centuries upon oatmeal gruel, and the Chinese, Japanese, Malays, and Polynesians live upon prepared rice, and yet have a high quality of tooth-structure.

Another says, "We should select our food more carefully with a view to its value as a tooth-builder rather than the pleasure it gives the palate." He is, however, unable to suggest any method or food that will meet this indication.

According to another, "Indigestion is far more often produced by defective teeth, which prevent proper mastication;" yet the Scotch, the Chinese, the Japanese, the present method of bringing up children, caring for the sick, etc., show that the teeth are not necessarily required for mastication. These do not have indigestion despite the fact that they live upon soft food.

According to another, caries is localized in places where there is no friction and where the enamel is thin, but decay often takes place upon cusps of all the teeth where the enamel is the thickest, and upon the buccal and lingual surfaces where friction is always present.

Decay of the teeth is more common among defectives in state and private institutions than among normal people. If further evidence in regard to tooth-decay and teeth degeneration be desired, compare the teeth of the upper and lower jaw.

Arrest of development of the upper jaw is more common than that of the lower, owing on the one hand to the fixed attachment of the upper jaw to the other bones of the skull under the law of economy of growth, and on the other hand to the mobility of the lower. Hitchcock, Magitot, and others have found decay of the teeth more frequent on the upper than on the lower jaw. The checking influences of the nervous system which produce arrest of development of a jaw-bone must affect the embryonic structure of the teeth, hence the more frequent decay upon the upper than the lower. Decay of the teeth is more common in arrested jaws where the teeth are irregular than in well-formed jaws and teeth. The lower jaw being movable, more blood is sent to the part and the bone is less liable to become arrested. The same explains why there is less decay of the teeth upon the lower jaw, as the vitality of the structure is greater.

Some English dentists have lately attributed the rapid decay of the teeth to the modern methods of manufacturing flour at the Minneapolis mills, ignoring the fact that teeth decayed nearly or quite as rapidly when the wheat was ground by the old-fashioned and slower process. Though each of these suggestions has some value, they are not far-reaching enough to account for all conditions.

More than two decades ago I laid stress upon the fact that tooth-degeneration or decay was a natural process which came under the law of economy of growth. This law is the law underlying developmental pathology. No organs of the body illustrate the law of use and disuse of structures so well as the teeth. Once they were the all-important for the life of the animal; now man may live three decades beyond threescore and ten without them.

The cone-shaped tooth found in the reptilian type and in toothed birds is the primitive tooth.* These were primitively organs of the skin which developed over the surface of the body. They were well nourished through the pulp. The teeth of the shark first departed from the primitive type, since they did not develop upon the surface but deep down in the tissues. These changes in tooth-evolution were for the benefit of the animal; this method of tooth-formation—converting epithelial cells, without vascular supply, into enamel rods—is a ready degeneration of the cell for the body's benefit.

Degeneration or its ultimate, decay, as I have called it in my lectures and papers, progresses with change in shape of the tooth from the cone. Two theories are advanced as to the method of evolution from the cone tooth to the bicuspid and molar—the *concrescence* theory by Mag-

* Osborn.

itot and the *differentiation* theory by Osborn. So far as this article is concerned, it makes no difference whether the primitive cone teeth group themselves together in twos or fours to form bicuspids and molars, or the single cone tooth gives off shoots or buds to form cusps and roots. As the vertebrates develop into a higher organism, a mixed set of teeth is necessary for the habits and convenience of the animal. These are divided into incisors, canines, bicuspids, and molars.

Under the law of economy of growth, the face, jaws, and teeth change according to the environment of the animal. Living in the open air upon primitive coarse foods obtained and prepared by the mouth, large jaws and good sound teeth prevailed. The function of the alimentary canal was performed suitably with the environment. Extreme as was the change from the holding, cone-shaped tooth to that of the masticating bicuspid and molar, the bell-shaped crown, with thick well-formed enamel for grinding and crushing was conducive to health.

Tooth-decay necessarily goes hand in hand with rise in evolution. This evolution is a race for supremacy between the bodily man and the man of brain. The teeth of the anthropoid apes are large at their sockets and the crowns taper to sharp cusps. The canines are prominent, taking the type of the carnivora.

In the lower races a slight change occurs. The roots of the teeth are closer together, the necks smaller, the crowns broader. In the higher, the roots are still closer together, the alveolar processes longer and thinner, the necks of the teeth smaller and the crowns smaller, least bell-crowned, and the sides of the crowns straighter. Between these two descriptions the teeth of man have reached the highest physical development in evolution both as to quality and number. The perpendicular line between the brain-development and facial atrophy has now been crossed. Pathologic conditions of the teeth and jaws necessarily begin. The brain has developed at the expense of the jaws and teeth under the law of economy of growth. Man reached his highest physical development when he had thirty-two well-formed teeth. The continued recession of the jaws no longer permitted thirty-two teeth. They are now being dropped commencing at either end of the jaw. The third molar and the lateral incisor are growing smaller. The shark, certain reptiles, toothed birds, many marsupials and some mammals have as many as seventy-two teeth. Advance in the line of higher types is made by dropping teeth in front and behind.

While these changes are progressing, tooth-structure is degenerating in density, thickness, and quality. Pits, furrows, and grooves in the enamel and interglobular spaces in the dentin are the rule. People with unstable nervous systems suffer to the most marked degree. Other evidences of jaw and tooth-degeneration in muscles and their attachment have been observed. Retraction of the upper lip in anger, uncovering the canines, is an atavism, since it is present in all carnivora preceding combat, whence its marked condition at puberty. Harrison Allen pointed out that the alveolar borders tended to parallelism in savages while in civilized races the height of the anterior alveolar border was greater than in the vicinity of the molars, from degeneration of the platysma myoides muscle. Jaw muscles and their attachments are much smaller in modern than early races. Ward found the lower jaw much lighter in civilized races.

The struggle for existence between the jaws and teeth is not always harmonious. Arrests of jaw take place owing to an unbalanced nervous system; the teeth do not become arrested in proportion to narrow cone-shaped crowns. This is tooth-degeneration. In most cases, diminution in size of the dental arch does not keep pace with the arrested jaws, and irregularities of the teeth result, or the third molars become impacted between the second molar and ramus. The structures of the enamel now become faulty; pits and fissures are observed in the enamel and interglobular spaces in the dentin.

The skulls of ancient Egyptians, Greeks, Roman soldiers, Etruscans, Phœnicians, ancient Lake-dwellers of Switzerland, Firbolg, and prehistoric skulls from the Irish bogs, Peruvians, ancient Hawaiians, Cliff-dwellers and Mound-builders, all show incipient tooth-decay. When caries is found it is in the sulci of the crowns—very rarely, if ever, at any other point. If such a condition should occur, the starting-point would be in the sulci, where the enamel is defective. In most cases only a dark line is observed in these fissures. The enamel is so perfect, thick, and dense that decay is almost impossible. The only faultily developed tooth-structure is located at the weakest part of the enamel, the sulci. The same conditions are observed when decay is found in the teeth of animals. The fissures are the first to be diseased.

In modern races, owing to faulty development decay may occur at any point, not excepting the cusps, as well as in the fissures of the teeth. The more advanced the race in civilization the greater is the mental development, with the greater local degenerations.

A class of cases which have come under observation are as follows: Children of strong, healthy constitution may erupt all their permanent teeth, anterior and including the first permanent molars, with fairly good enamel and with little or no decay. At seven, eight or ten years of age, after one or more of the eruptive fevers, the second permanent molars erupting have faulty enamel in the sulci and at the buccal pits. Decay may take place within a year; the cavities starting in the sulci and in the buccal pits may be so large as to meet—the enamel and dentin being quite soft in these teeth, showing conclusively that the constitutional diseases affected the enamel and dentin through the blood streams and nerve endings before the teeth erupted. The modern etiquette (munching the food with the lips closed and without mastication, and cutting the food with the fork instead of the knife) is bringing about a greater change in evolution under the law of economy of growth, or use and disuse of structures, than any one thing. The teeth of this class under the microscope show fissures and defects throughout the enamel.* Here then are the great underlying causes of tooth-decay, namely "want of tooth-resistance" from within, disuse, and tooth-degeneration along the line of evolution and disease.†

Résumé.

1. Few dentists have had proper analytic training.

2. A broader education is necessary to practice stomatology successfully in the future.

3. Pathology of the head, face, jaws, and teeth must be studied along broader lines.

4. In the evolution of man, the face, jaws, and teeth are sacrificed for the benefit of the brain.

5. Degeneracy, or suppressive evolution as Thompson calls it, is a part of developmental pathology, which exerts beneficial or malign influence according as it attacks a lower structure for the benefit of a higher, or sacrifices the higher to the lower.

6. It may sacrifice brain potentialities to the jaws and jowl, as in the ape, or *vice versa* as in higher man.

7. The teeth decay more rapidly in pregnancy and constitutional diseases, especially in those cases where the nervous system is involved.

8. The teeth of primitive races decay, but the starting-point is always where the enamel is defective.

9. Decay of the teeth is commoner in arrested jaws than in those that are well developed.

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* I have examined the enamel of teeth under the microscope sufficiently to warrant my conclusions. I have only to refer you to the beautiful specimens of defective enamel illustrating the paper of W. D. Miller read at the Fourth International Dental Congress (see Cosmos for January 1905) and "Is there Uncalcified Tissue in the Enamel?" by Douglas E. Caush, Brighton, Eng., published in Cosmos for February 1905.

† Talbot: "Constitutional Causes of Tooth-Decay," Cosmos for January 1905.

10. Decay is more common in the teeth in the upper jaw than in the lower.

11. Jaw and tooth-degeneration under the law of economy of growth, whereby a structure is lost for the benefit of the organism as a whole, is the greatest determining cause of tooth-decay. Without it, lactic acid ferment would rarely act, if at all.

12. Lactic acid ferment is an exciting cause of tooth-decay in man's evolution.

13. Tooth-decay naturally occurs hand-in-hand with rise in evolution.

14. Rise in evolution means increased control by the central nervous system of local nerves, whether of growth, sensation or motion, so that explosive performances do not occur as in lower types. Resultant disuse by the local nerves of function results in lessened nutrition. The jaws and teeth, being variable structures, are most affected by control of local trophic sensory or motor nerves, since it is in unstable variable structures that explosive excess is most apt to occur.

ALLOYING PLATINUM WITH GOLD.

By Mr. J. HERBERT BARTON, St. John, N. B.

PURE platinum cannot be melted by the ordinary gas blowpipe, nor can it be directly alloyed with gold, excepting at very high temperature maintained for a considerable length of time; but there are some metals with which it can be alloyed, and once alloyed with these it readily fuses with gold.

In some experiments conducted by myself, I attempted to fuse with the ordinary gas blowpipe equal parts of platinum and gold; platinum and silver, and platinum and copper.

In the case of the platinum and gold, the platinum could not be induced to melt at all; the gold merely melted and flowed over and around it.

In the case of the platinum and silver, the platinum partly fused and made an indifferent alloy, some pieces only partly melting.

But with the copper combination, the platinum fused thoroughly, making a homogenous piece of metal throughout. Once alloyed with copper it readily fused and mixed with gold.

Applying this to the making of platinized gold, I take my alloy, consisting of platinum, silver, and copper, and thoroughly melt, then add my gold. I have found the following a splendid formula:

Pure gold	18	parts.
" platinum	2	"
" silver	2	"
" copper	2	"

Place the platinum, silver, and copper on a hollowed piece of charcoal on the melting-frame, and, using borax for a flux, direct a good hot blast of flame from any good blowpipe, with foot bellows (I use a Melotte's pipe with No. 7 Buffalo foot bellows), and the metals will soon fuse; get the heat as intense as possible, and hold it there for a few minutes, then add your gold and remelt, shaking or mixing with a piece of wood to insure a good mix. Pour into an ingot, or it may be left to cool on the coal, after which it can be rolled into plate or drawn into wire.

This metal is second only to steel in hardness and elasticity, and has a high fusing-point. It is much superior to the clasp metal sold at some of the depots, and is excellent for making clasps for partial rubber dentures, bands, ribbons, wires, screws, etc., for regulating appliances, posts for Richmond crowns, etc.

PROCEEDINGS OF SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

Monthly Meeting, April 1905.

A REGULAR meeting of the New York Odontological Society was held on Tuesday evening, April 18, 1905, at the Academy of Medicine, No. 17 West Forty-third street, New York city.

The president, Dr. John I. Hart, occupied the chair and called the meeting to order.

INCIDENTS OF OFFICE PRACTICE.

Dr. H. W. GILLETT. I want to say a word in addition to what I said the other night about Dr. Clapp's toothbrush. I find the smallest size very valuable for cleaning under and around regulating appliances. It is especially useful for those difficult places, the bifurcations of the roots, when in cases of pyorrhea the gum has receded until the bifurcation is exposed.

The second point I want to mention is with regard to a material for instrument handles. I have been interested for some time in trying to get the manufacturers to make a cone-socket handle which should be smooth, and therefore easy to keep clean. Steel is open to the objection that when boiled the point is liable to be rusted in the socket. I have recently found an aluminum alloy which seems to be workable, and which is not attacked by mercury or by phosphoric acid, and seems well adapted to our needs.

Still another point I wish to make is in reference to orthodontia, and yet I thought it would scarcely be germane to the subject of the paper, and I consequently asked permission to bring it before you under this head.

All of the writers on orthodontia, of recent date, advocate the use of German silver in making regulating appliances. The reasons generally advanced for its use are that German silver is more rigid, and stretches less than gold under the same conditions, and that it is more economical. I have in my hand a piece of 18-k. gold, No. 36 gage. You notice what it does when I spring it—like this [illustrating]. I do not think you can find German silver any more springy or better for our purpose than this. This afternoon I made a band of this gold, and with it I will pass around a German silver band of the same gage, so by trying them both you can get an idea of their relative stiffness. I want to find a manufacturer who will furnish us with seamless gold bands of this kind; and if three or four more of you have the same desire, it will not be difficult to get it.

I want to speak further on the question of economy. German silver is no more economical than gold for this use, because the value of the time of any man who is capable of making regulating appliances more than makes up for the cost of the material, since it takes more time with German silver to finish the appliance. The regulating appliance of German silver is two or three hundred per cent. more expensive than gold—providing we have suitable gold—and much more unsightly in use.

Dr. Wilber M. Dailey then read the paper of the evening, entitled "Malocclusion of the Deciduous Teeth." This paper was illustrated by lantern slides, and was as follows:

Malocclusion of the Deciduous Teeth.

The object of this paper is to consider the malocclusion of the deciduous teeth, and the indications which can be observed from their positions, development, etc., that will affect the occlusion of the permanent teeth. I cannot agree with an author who writes: "Irregularity of the deciduous teeth is of rare occurrence, and when present is generally confined to one or two teeth—more frequently the incisors." Nor do I agree with another author who says: "Irregularities of the teeth cannot occur until they have erupted (as nothing can exist except it be present) and have thus shown their relation to each other and to the jaw. The deformity always commences at the sixth year and is completed at the twelfth. Forward movement of the posterior teeth produces the same result as arrest of development of the maxillæ."

I have found that malocclusion of the deciduous teeth is not confined to one arch or one tooth. I have seen it not only in one arch, but in both—not only in one side of the arch, but in both sides—and it is the main feature of my paper to bring this to your attention.

Malocclusion of the deciduous teeth exists in the same proportion as it does in the permanent teeth. The reason the cases are not observed is that they are not noticeable. This is due to the shortness of the crown of the tooth, and the teeth, being smaller, are not so conspicuous; besides, the cusps of the occluding planes are not so well defined.

Malocclusion of the deciduous teeth does exist, and is far more common than authors will admit; and I wish to emphasize the necessity for recognizing these cases and correcting them at once, and not waiting until the eruption of the permanent set, for in the permanent teeth the malocclusion becomes aggravated.

In the deciduous teeth there are many conditions which must be observed as bearing directly upon the eruption and occlusion of the permanent teeth. Of these I shall speak briefly, and shall later demonstrate by lantern slides cases which have come under my care and observation.

Each case of malocclusion of the deciduous teeth must be diagnosed and treated by first ascertaining the cause. If that rule is followed, the correction is easily made. This rule also applies to the permanent teeth.

There are many causes of malocclusion of the deciduous teeth. The most common are:

(1) Congenital anatomical defects.
(2) Constitutional or inherited causes.
(3) Imperfect development of jaw or arch, or both.
(4) Pathological conditions.
(5) Nasal obstructions and adenoids.
(6) Irregular eruption of the deciduous teeth.
(7) Supernumerary deciduous teeth.
(8) Habits acting mechanically.
(9) Caries on the approximal surfaces of one or more deciduous teeth.
(10) Pulpless deciduous teeth.
(11) Premature loss of deciduous teeth.
(12) Impacted deciduous teeth, etc.

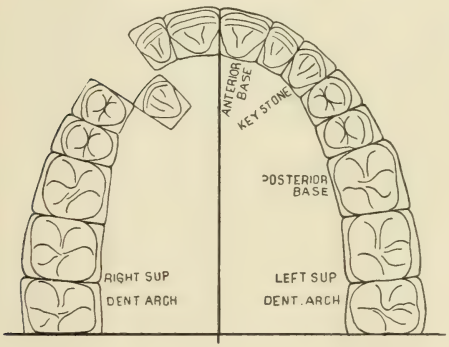
I have found the most prevalent cause to be that of the improper development of the arches, and here desire to call your attention to the importance of carefully observing the development of the pre-maxillary portion of the maxilla.

Dr. Angle calls attention to "Class I—Relative positions of jaws and dental arches mesio-distally normal, with molars usually in normal occlusion. The average case is where the arches are more or less reduced in size, with a corresponding bunching of the teeth, usually confined to the incisors of both upper and lower arches." Class I of malocclusion

numbers 692 cases in 1000. You will therefore see the great importance of close observation of the pre-maxillary portion of the dental arch.

Numerous authorities on orthodontia, in showing the dental arch, call attention to the canine tooth as the keystone. No architect would call attention to the keystone situated in that position in

FIG. 1.



—*Talbot.*

The formation of the normal arch depends upon the development of the pre-maxillary portion of the superior maxillary, and these as they unite form the true keystone of the dental arch. The canine tooth here is marked as keystone: the canine, however, has but little wedging influence and is forced to erupt into a position dependent to a great extent upon the pre-maxillary development. This development is clearly shown in Fig. 2.

an arch, because the keystone is always situated on the median line of two lateral halves of an arch. If you will stop to think of the shape, form, and contour of the pre-maxillary portion of the arch to which I have referred, you will see that the pre-maxillary bones act as a perfect keystone placed in its proper position from an architectural as well as an anatomical standpoint. This pre-maxillary portion, when not expanding laterally as it should, is responsible for the narrow arch, and probably gives the impression that the canine teeth are the cause of the malocclusion; for by reason of this non-development they are forced either inside or outside the proper dental arch.

The germs of the deciduous and permanent incisors are developed in the pre-maxillary portion of the superior maxillary. If the deciduous germ or tooth be forced into malposition by improper development of the pre-maxillary, or by habits acting mechanically, it is obvious that the position of the permanent germ or tooth will be affected.

In reference to this development, I wish to quote Dr. Jackson, as follows:

"With young patients the stretching of the pre-maxillary bone encourages its development. The suture between the pre-maxillary and the palatal processes of the maxillary bones is not fully united in early childhood. Flat bones grow from their edges; the pre-maxillary may be numbered with this class. During its development it can be encouraged by pressure to take on a different form, and therefore better results are obtained if the change be made while the alveolar process and jaws are in this active stage of development."

Dr. Angle illustrates in his book on Malocclusion the common causes of this insufficient development in the pre-maxillary portion of the jaw where the permanent incisors have erupted, and calls particular attention to it when he says:

"The arches being thus deprived of the wedging and retaining influence of the teeth, the external pressure of the lips has closed the space and diminished the size of the arch. At the same time, pressure of the lips and cheeks (aided by the occlusal planes) is gradually molding the upper arch to conform to the abnormal size of the lower."

Again Dr. Angle says:

"It will thus be seen how effectually the maintenance of the malocclusion has been provided for, and how hopeless it is to expect nature to correct this deformity unaided. As well might we expect the self-cure of strabismus of the eye or curvature of the spine. How absurd, even pernicious, then, is the common advice of many dentists to parents to 'let nature alone and the teeth will straighten themselves.' These same influences may

be traced in a similar manner in any case of malocclusion."

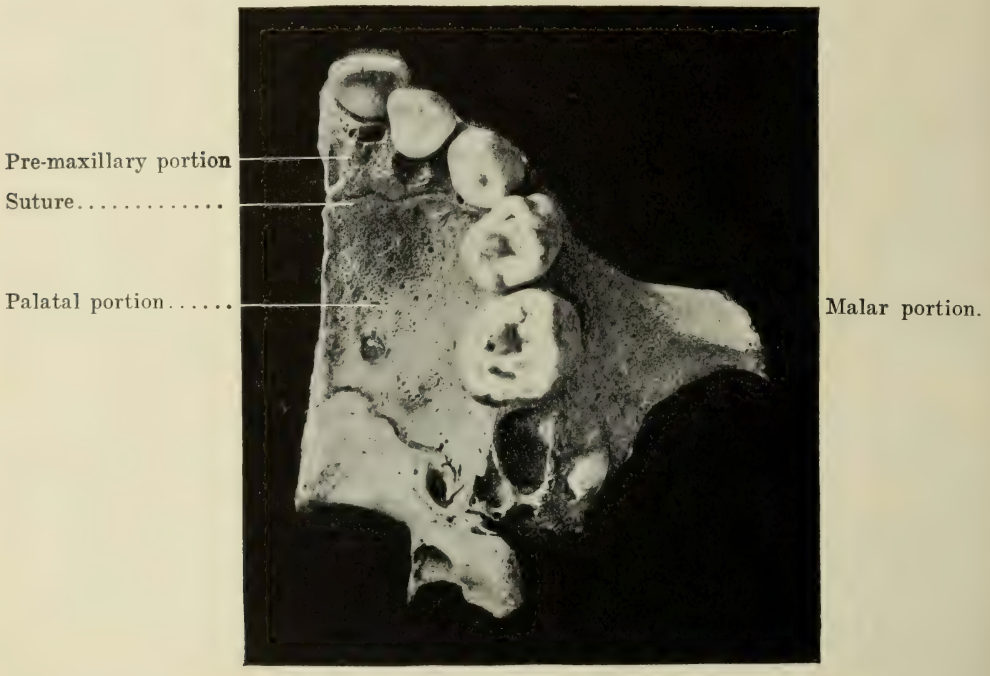
We notice in most cases where there has been a proper development of the pre-maxillary portion of the arch, and when not complicated by other causes, at the fourth year (and even in some cases earlier), a gradual increase of the interproximal space between the deciduous incisors and canines of both arches, which continues until the eruption (in this region) of the permanent teeth. There will be sufficient space to allow the permanent tooth to erupt without interfering with adjacent deciduous teeth; but as the deciduous molars are generally larger than the bicuspids which are to occupy their places, we sometimes find that there is a space between the newly erupted bicuspid and the first molar; this is soon closed by the eruption of the canines and the second molars.

We can therefore see the importance of this spacing and the gradual indication by it of the arch development, and my claim is that we have an indication of the position of the permanent teeth given to us by the positions of the deciduous teeth.

It is our duty as dentists to study more closely the malocclusion of the deciduous teeth and its effect upon the permanent teeth and arches, and it should be our endeavor to preserve the deciduous teeth with the same professional skill and care that we do the permanent teeth; also, if, from any unforeseen cause one or more deciduous teeth should be lost prematurely, some mechanical means should be applied to retain the deciduous and permanent teeth in their proper occlusal planes and to maintain the proper size of the dental arches.

See further illustrations—Figs. 3 to 33.

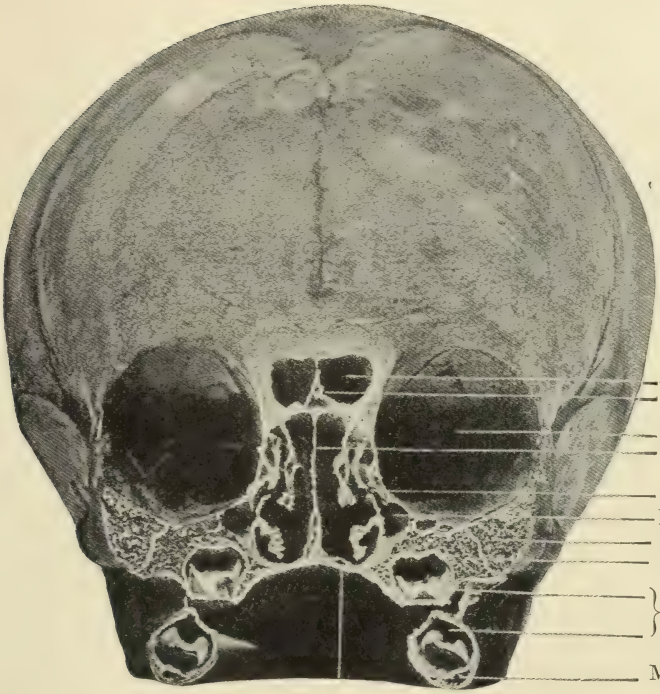
FIG. 2.



—*Broomell.*

We have also the locking of the deciduous lateral incisor inside of its normal position, which is a condition that would affect the permanent teeth, for it diminishes the wedging influence necessary to proper development.

FIG. 3.



—*Cryer.*

Skull of fully developed embryo cut vertically through the first deciduous premolars. This illustration brings into prominence two conditions: first the extreme width of one jaw as compared with the other, and second, the small maxillary sinus at this period.

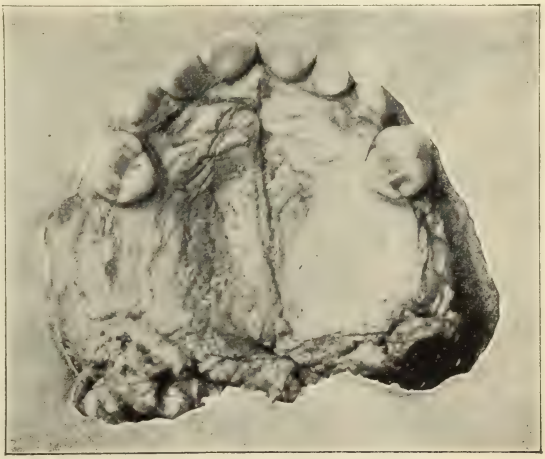
FIG. 4.



—*Broomell.*

Hard palate from a nine-months-old child. (Actual size.) The arch line here is clearly marked; and here again it presents a deciduous malocclusion, for the deciduous lateral incisor is inside of the normal arch.

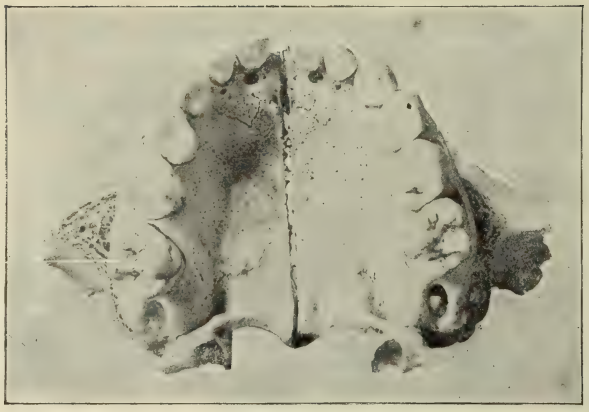
FIG. 5.



—*Broomell.*

Hard palate from a two-year-old child. (Actual size.) The deciduous lateral incisor in this case is turned.

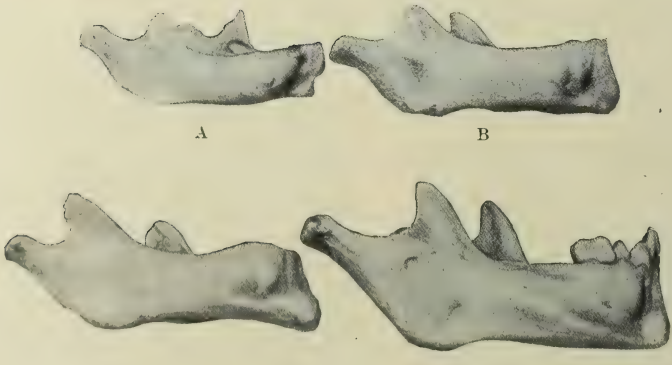
Fig. 6.



—*Broomell.*

The upper dental arch about the seventh year. This illustration presents approximal spaces on the right maxilla between the right deciduous central and lateral incisors, and none on the left maxilla.

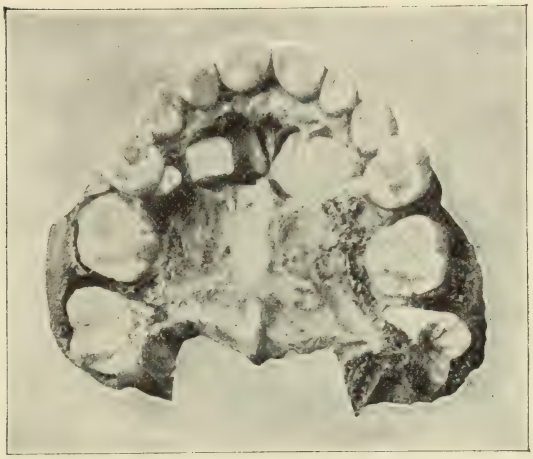
Fig. 7.



—*Cryer.*

Four mandibles ranging from birth to eighteen months. A, at birth; B, at three months; C, at 6 months; D, at eighteen months. The gradual development, changing of form, and the increase of the bony portion of the inferior maxillary is clearly shown.

FIG. 8.



—*Broomell.*

Development of the teeth about the second year. The permanent lateral incisors developing—and even at this early stage we have the beginning of the approximal spacing, which increases as the other permanent teeth develop. The importance of this spacing cannot be overestimated.

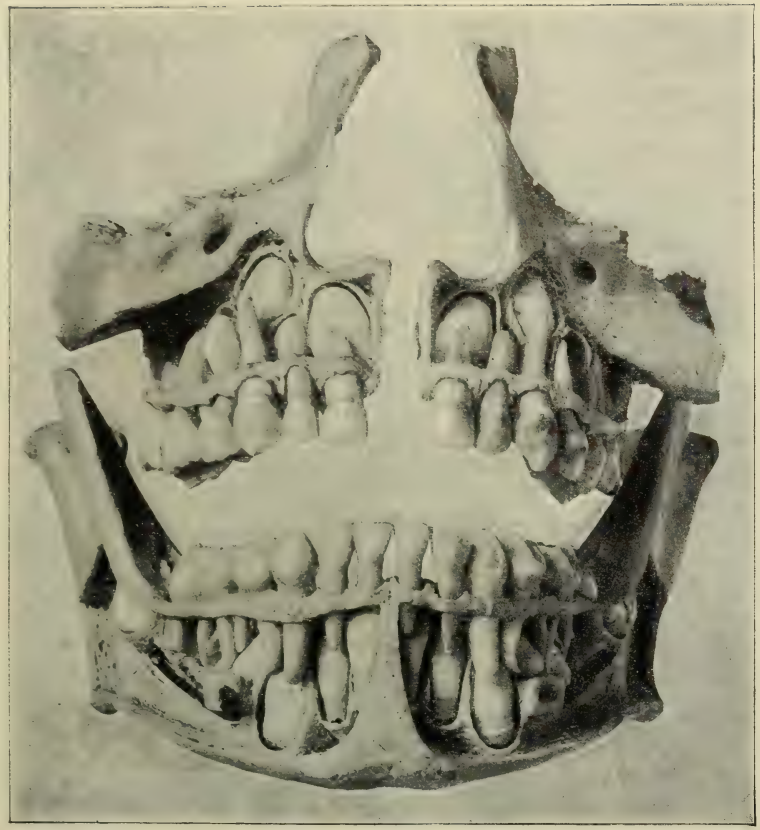
FIG. 9.



—*Broomell.*

Showing that the body of the mandible is small as compared with the alveolar process containing the teeth in the course of development, and it can be readily seen how much more easily development of the alveolar process can be assisted at this stage, than when the bony portion of the mandible increases.

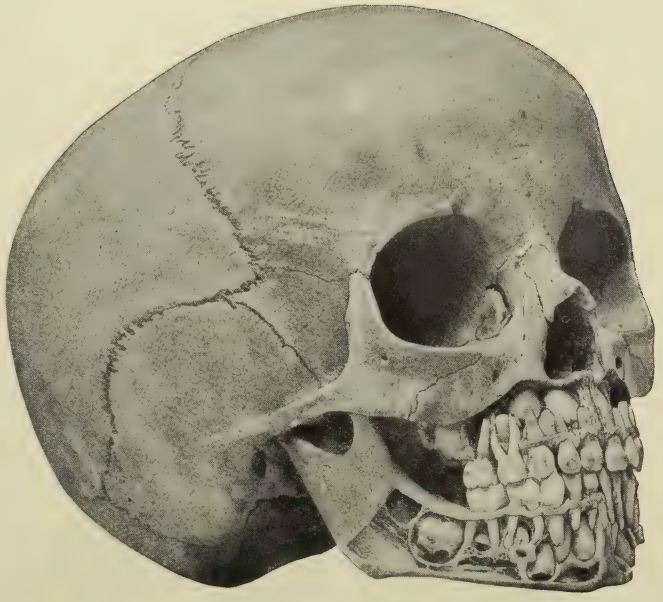
Fig. 10.



—*Broomell.*

We see how little wedging the developing permanent canine is doing; and its position is dependent upon the space formed by the first bicuspid and lateral incisors.

Fig. 11.



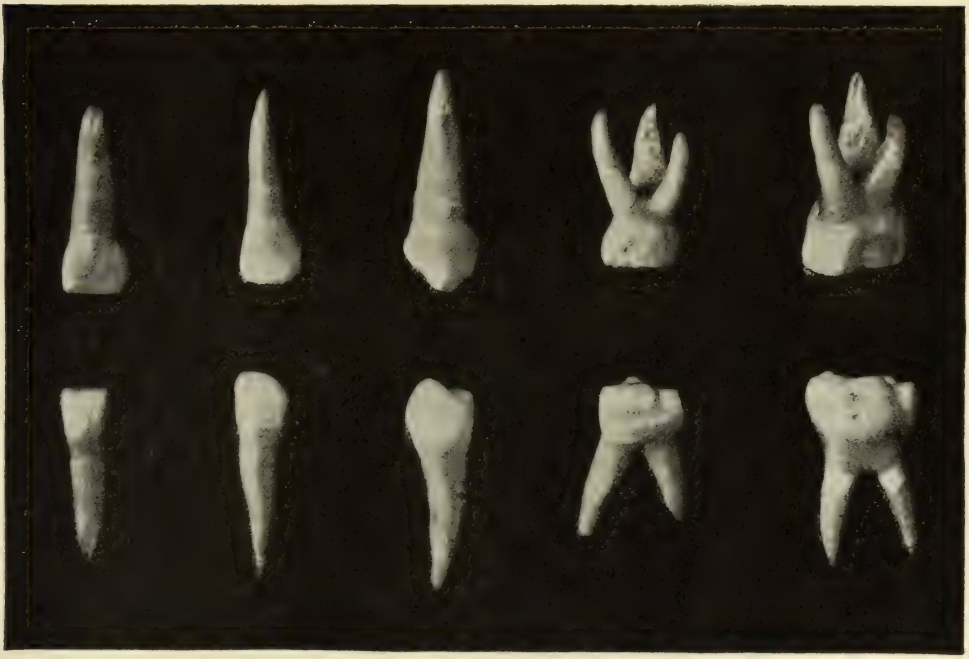
—*Cryer.*

Skull of a child about six years old, showing all the deciduous teeth in position and the developing permanent ones. In this case there has not been the approximal spacing of the deciduous teeth, and the upper deciduous molars are anterior to their proper occluding positions. If in this condition the upper first molar should erupt, it would force the upper deciduous molars forward and develop malocclusion.

FIG. 12.

Central incisor. Lateral incisor. Canine. First molar. Second molar.

UPPER.



LOWER.

Central incisor. Lateral incisor. Canine. First molar. Second molar.

—*Broomell.*

The roots of the deciduous teeth are seen to be two to three times the length of the crown portion.

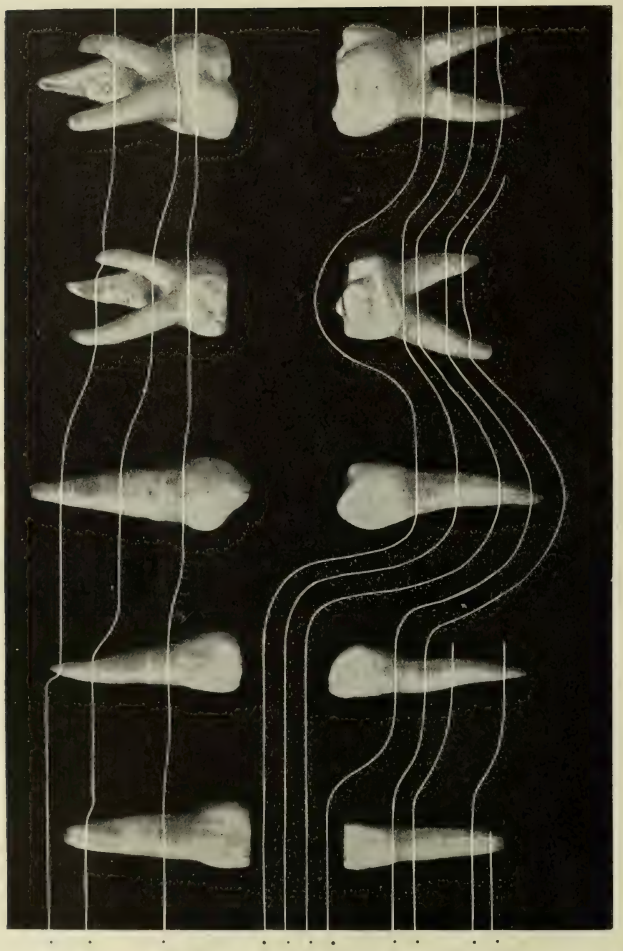
FIG. 13.



—*Broomell.*

Occlusal surfaces of the deciduous molars. The absence of well-marked cusps on the occluding surfaces of the deciduous molars is plainly shown.

Fig. 14.



—*Broomell*, after *Peirce*.

Chart showing calcification and decalcification of the deciduous teeth and the consequent length of the pulp-canal at various periods. Shows by diagram the stages of calcification and decalcification. This should be given careful study, for it is of great assistance to the dentist interested in orthodontia.

FIG. 15.

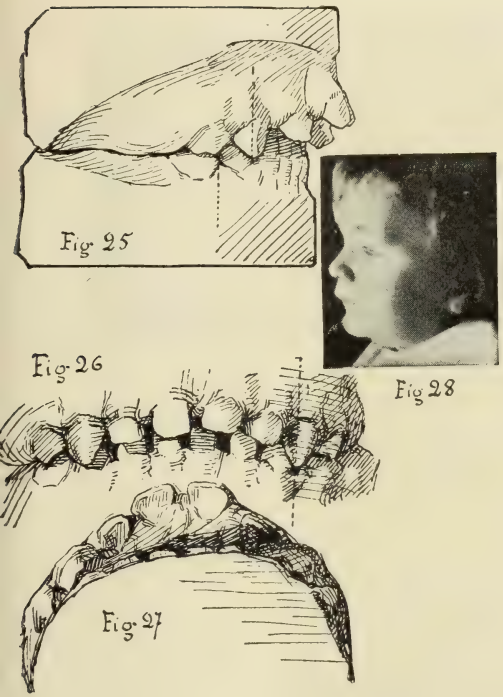


FIG. 16.

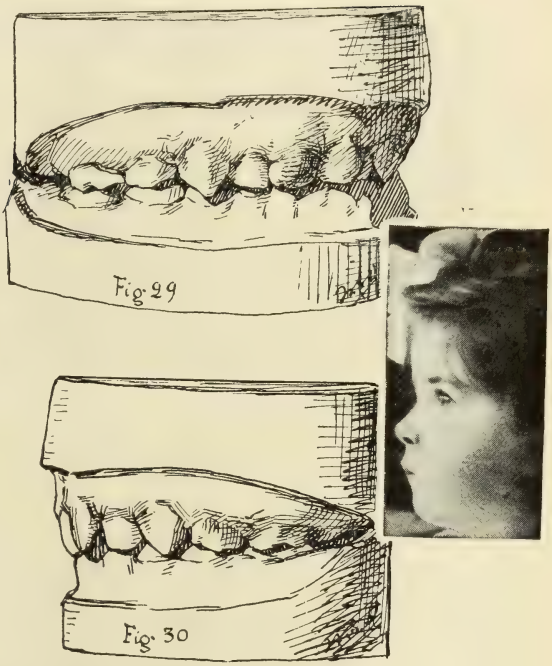


FIG. 17.

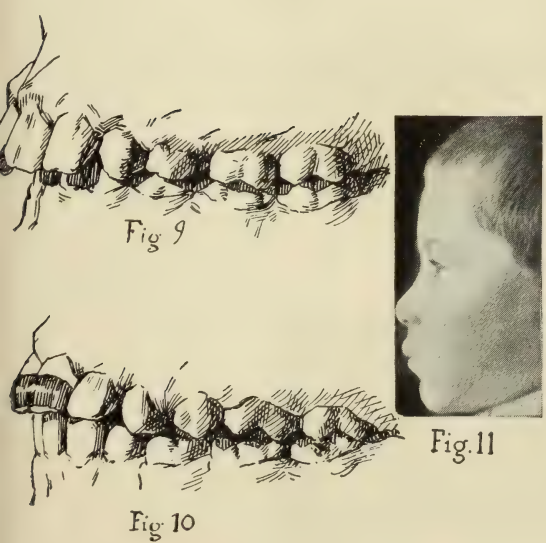
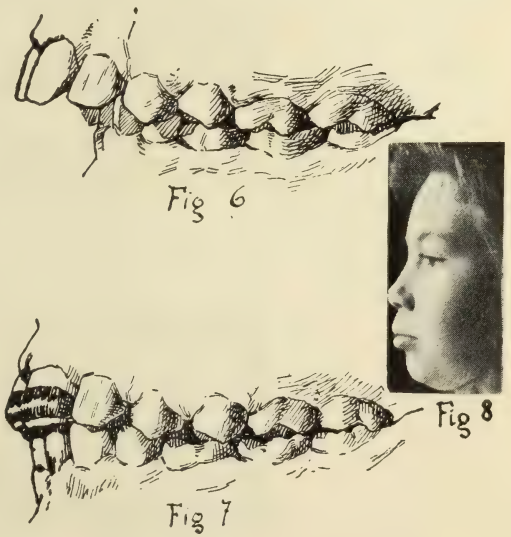


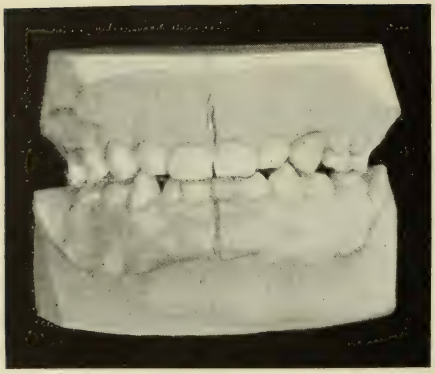
FIG. 18.



—*W. S. Davenport.*

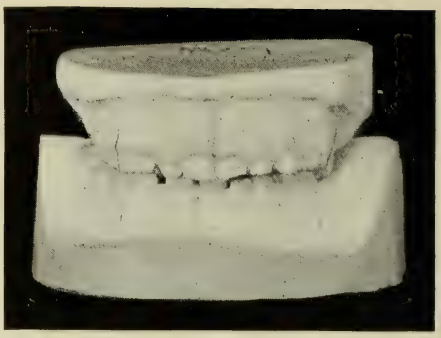
FIGS. 15–18. Illustrations taken from Dr. Davenport's article, "Correction and Prevention of Malocclusion by the Bite Guide and Other Methods," in the March 1905 issue of the COSMOS, showing malocclusion of the deciduous teeth.

Fig. 19.



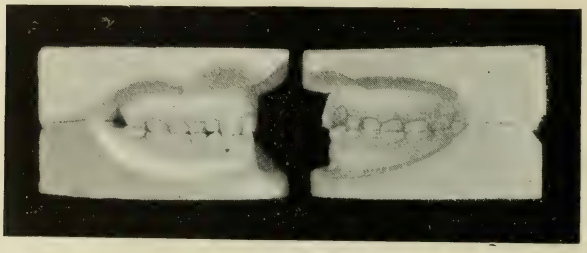
Female, age six years. In this case there has been a reduction in the size of the arch due to caries on the approximal surfaces of the deciduous molars and canines.

Fig. 20.



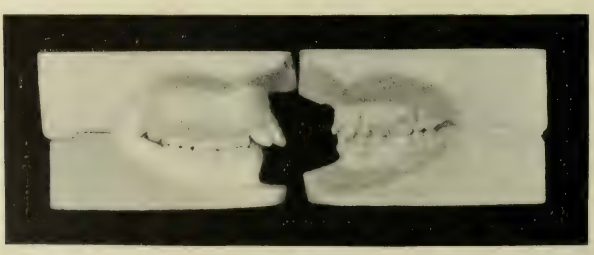
Male, age seven years. Owing to the loss of the deciduous lower right lateral incisor the space has been closed, leaving insufficient room for the eruption of the permanent lateral incisor. There is also a prominence of the pre-maxillary portion. This case presents a feature of interest—a supernumerary deciduous upper right lateral incisor.

Fig. 21.



Right side, female, age eight. Left side, female, age nine. Two cases of lateral contraction, and the improper occlusion of the molars can be readily seen. The permanent molars erupted into position similar to deciduous molars.

Fig. 22.



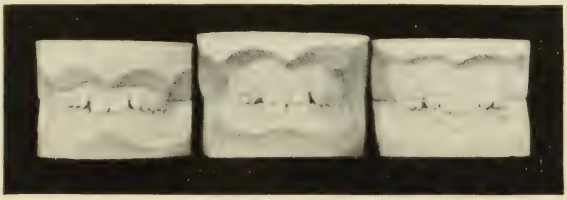
The upper molars in these cases are mesial to their normal positions. In one case we have the upper central incisors locked inside of the arch; in the other they have protruded. There is also a diminution in the size of the arch.

FIG. 23.



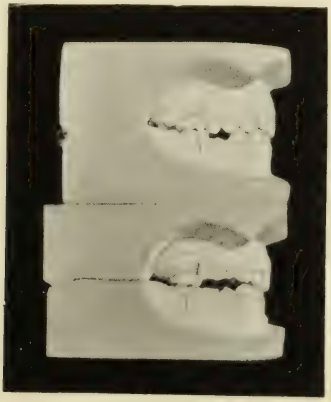
Here we have the left upper lateral incisor and the cusp of the right upper lateral incisor erupting in an abnormal position because of the improper development at this point. If the spacing of the deciduous teeth had been assisted, there would not be present this malocclusion. The posterior teeth have been pushed forward by the erupting of the first molar.

FIG. 24.



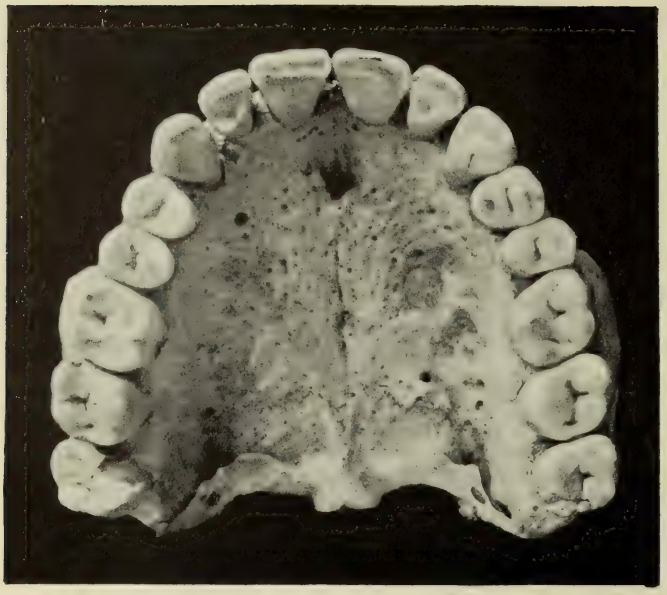
This is another case of insufficient development of the pre-maxillary portion, and the lateral incisors erupting distally to their normal position. Even with the space gained, the arch had to be expanded further to allow the permanent canines to erupt normally.

FIG. 25.



We have made space allowing the upper second bicuspid to erupt into its normal position by removing the upper molar distally. The first upper bicuspid is now in its proper occluding plane, the lower second bicuspid taking the place of the second deciduous molar.

Fig. 26.



—*Broomell.*

The hard palate, or roof of the mouth, with its membranous covering removed. Flattened condition of the pre-maxillary portion.

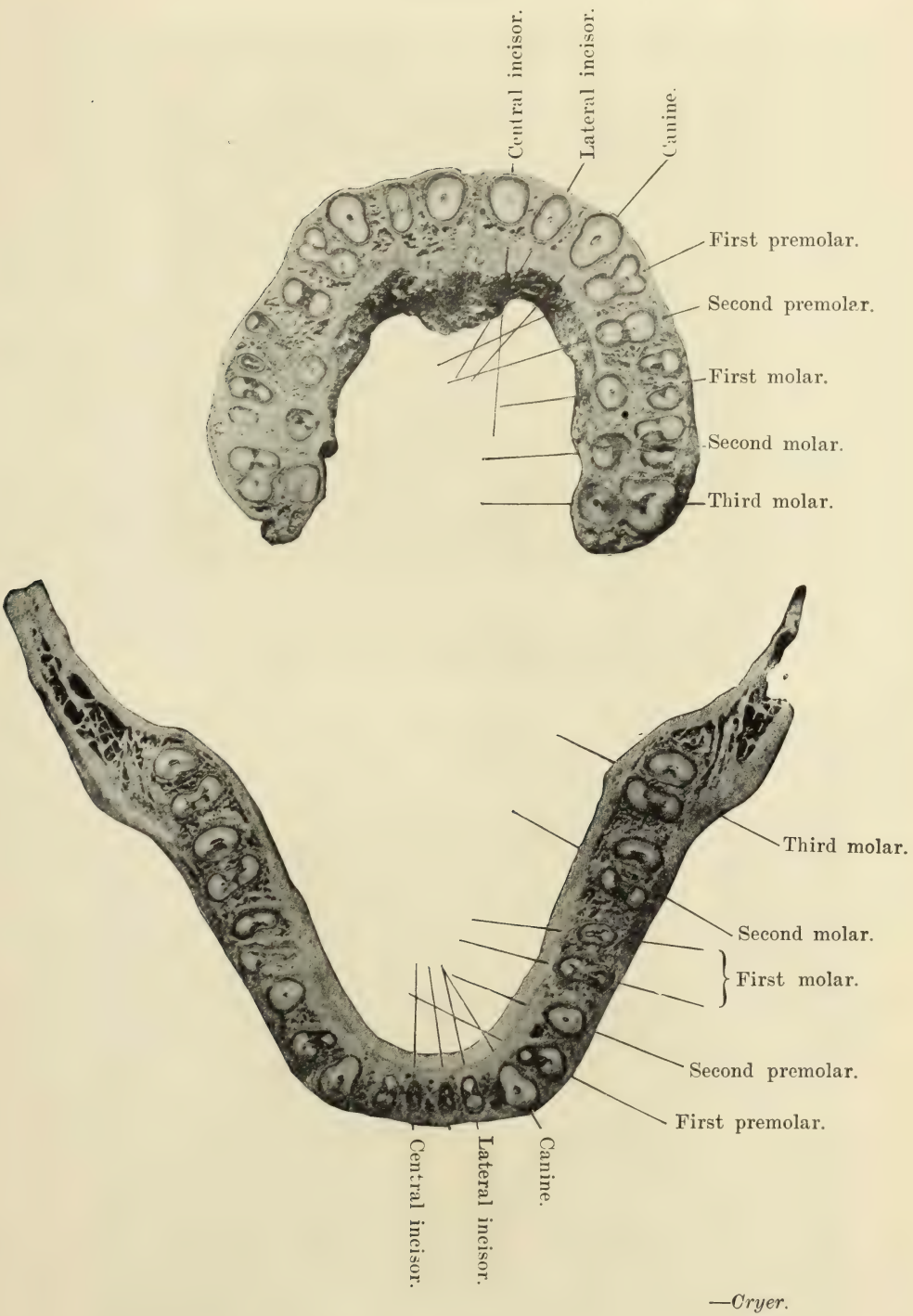
Fig. 27.



—*Broomell.*

In this illustration the flattened condition laterally of the six lower anterior teeth is readily seen.

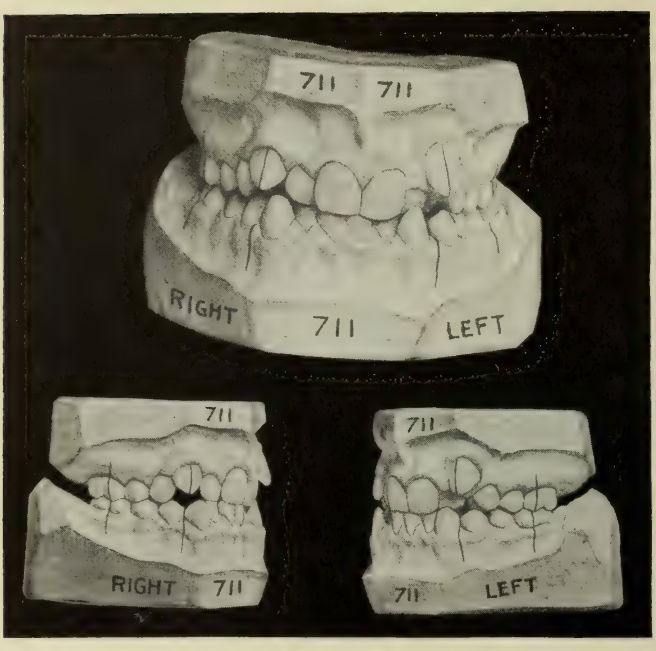
FIG. 28.

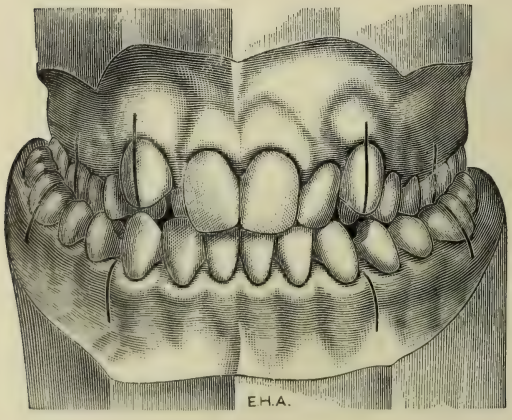


—*Cryer.*

Horizontal sections of the upper and lower jaws cut a little beyond the free margin of the alveolar process, showing the forms and positions of the roots of the various teeth. This illustration shows more clearly the condition indicated in Figs. 26 and 27.

Fig. 29.



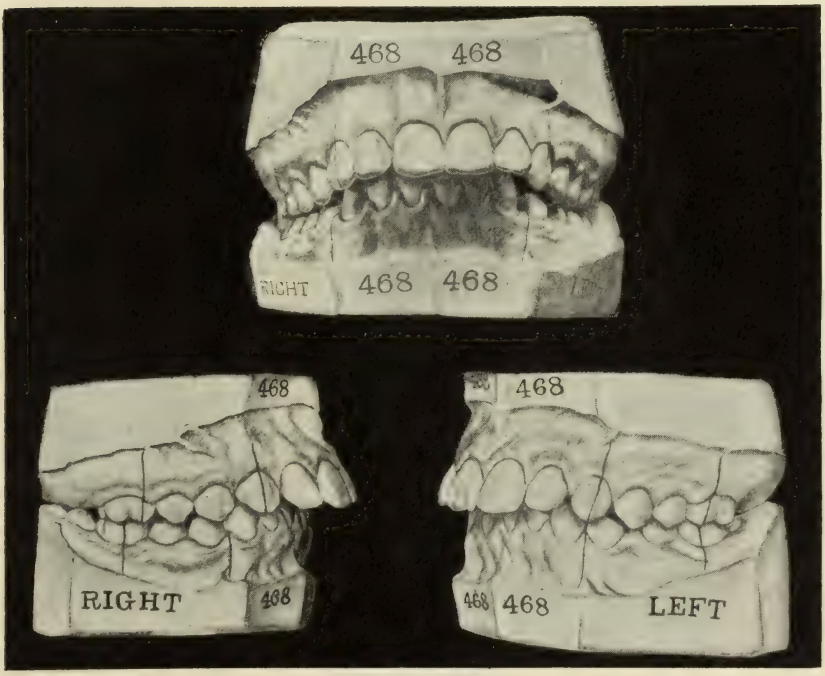


—*Angle.*

Figs. 29, 30, 31, 32 show improper development of the pre-maxillary portion, and are taken from "Treatment of the Malocclusions of the Teeth and Fractures of the Maxillæ," by Dr. E. H. Angle.

FIG. 30.



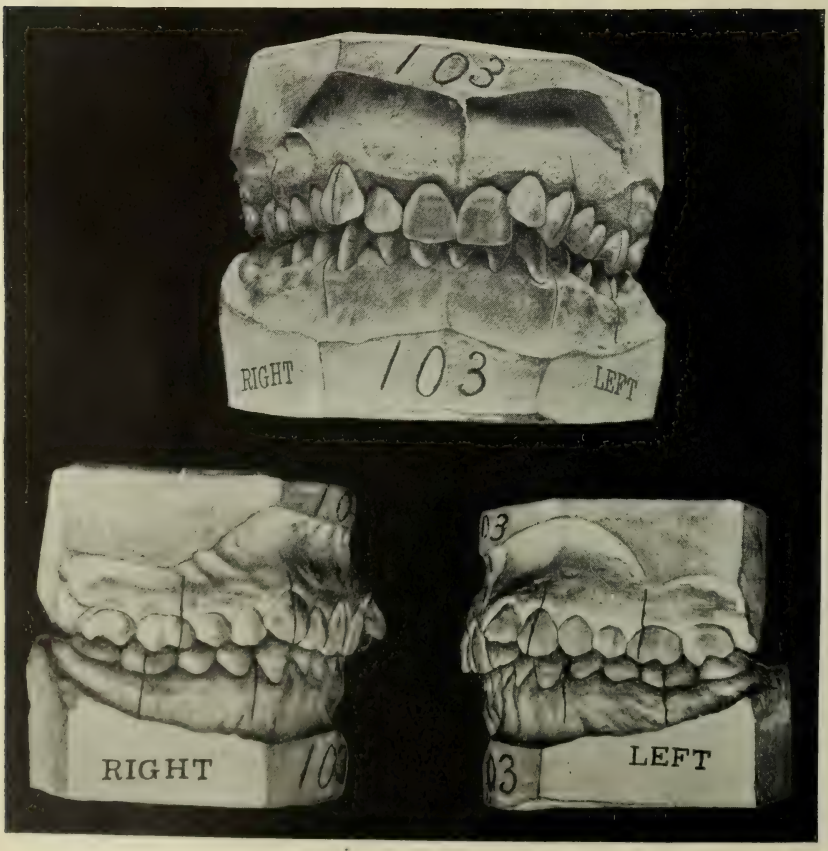


—*Angle.*

Showing improper development of the pre-maxillary portion.

Fig. 31.

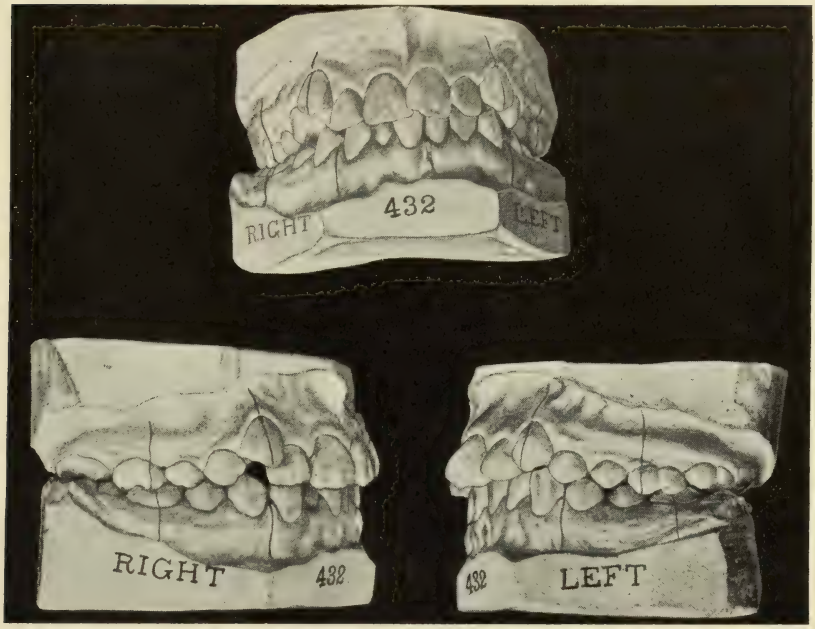




—*Angle*.

Showing improper development of the pre-maxillary portion.

FIG. 32.



—*Angle.*

Showing improper development of the pre-maxillary portion.

Discussion.

Dr. R. B. STANLEY. Malocclusion of the deciduous teeth is of special interest to the orthodontist and to the general practitioner of dentistry as well. It is the forerunner of difficulties to be encountered in the permanent denture, and if taken in time will, in a great measure, insure the normal eruption of the succedaneous teeth. There are also many instances demanding our attention where the occlusion of the temporary teeth is normal and yet there follows the most extreme disarrangement of the permanent teeth. Why this should be has so far not been satisfactorily explained. I believe more and more that the inharmony which exists between the development of the jaws and the eruption of the permanent teeth is due to a lack of proper use of the organs of mastication far more than to a mixture of different races or differences in the physical attributes or stature of the parents. The foods we eat today are not calculated to invite a wholesome use of the teeth, and therefore there is nothing to encourage the proper development of the jaws during their formative stage. Of course, there are other factors which intensify the malocclusion of the permanent teeth, and also factors which disturb the mesio-distal relation of the two arches, but these cases combined are less than half the number of those coming under that type in which the mesio-distal relation of the buccal teeth is correct.

I cannot agree with Dr. Dailey that malocclusion exists in the temporary teeth to the same extent that it does in the permanent denture. We find that in about 70 per cent. of the cases of malocclusion of the permanent teeth the mesio-distal relation of the buccal teeth is correct. The symptom of the malocclusion is usually an overlapping or crowded condition of the six anterior teeth. The cause is lack of room laterally, or lack of development of the jaws.

Now, many of these cases were not preceded by malocclusion of the temporary teeth. It is therefore imperative that we look upon these cases where the occlusion is normal with great suspicion, and if at the age of four or five years the little anterior teeth do not begin to show spaces between them we are justified in expanding laterally this portion of the dental arch, thereby encouraging the development of bone in that region. If taken at the proper time the operation can be confined to the lower arch —the force of occlusion being the factor in spreading the upper arch.

Where the mesio-distal relation of the arches of temporary teeth has been disturbed, more extensive treatment is required. In no instance is it necessary to rotate these little teeth. The sole object in treating these cases is to stimulate the proper development of the jaws.

Dr. Dailey referred to the canine tooth as the one designated by some authors as the keystone of the dental arch. It is true that that tooth does not act as such in the manner in which the first permanent molar does; at the same time it is a great factor in supporting the line of occlusion at that point, and is of the greatest value, taken in conjunction with the first permanent molar, in making a correct diagnosis. It is more apt in Class I to erupt in its correct mesio-distal relation than otherwise, due to the time of its eruption and its long, strong root.

Dr. Dailey has presented his paper, and shown slides on the screen of cases of interest in order to awaken closer attention to the unfavorable signs in the dental arches of the little children under our care. I heartily indorse the early attention to the temporary teeth, but only in so far as the conditions are directly unfavorable to the normal eruption of the permanent teeth.

Dr. R. M. Sanger, Orange, N. J. I do not know that I can add anything to what Dr. Dailey has so well presented to us. He has given us some matter which is food for thought. I cannot combat his statements because I have not studied the matter sufficiently to know whether he is right or wrong. In my own practice I should hesitate to put on any regulating appliance with children of three or four years of age; still Dr. Stanley assures me the bulk of the appliance put on would hardly be noticeable and possibly I am wrong in that matter.

Dr. Gillett. I welcome the paper as a contribution to the study of a subject which requires investigation. I think we shall know a great deal more about this matter in the next decade than we have known in the one just passed. It is an interesting field, and I shall stand by and cheer if Dr. Dailey will keep on.

Dr. W. D. Tracy. Our essayist tells us we ought to correct the malposition of the temporary teeth so as to insure the proper eruption of their permanent successors. The gentleman who opened the discussion says that we have no ground for believing that those cases which present normal occlusion of the deciduous teeth will necessarily exhibit normal occlusion of the permanent teeth. I know that I hesitate a great deal before putting appliances on the deciduous teeth. Having been told by those who know more about the subject scientifically than I do, that you cannot always be sure of having a correct result in the permanent teeth, even though you do establish a correct occlusion of the temporary teeth, it seems like a plunge in the dark to regulate the temporary teeth with the view of assuring perfect occlusion in the permanent set. If we could assure a correct eruption of their permanent successors, it would behoove us always to correct malocclusions in the deciduous teeth. For that reason, I want pretty definite evidence that I shall be rewarded by having a permanent occlusion that is correct, before I undertake to establish a correct occlusion of the deciduous teeth.

Dr. S. G. Perry. I did not get here until very late, therefore I did not get the trend of the paper. I was in time for the closing sentence, which was that

the space occupied by the temporary teeth should always be preserved. I have always believed that. I like to preserve the space that has been made by the loss of a temporary tooth. It has not been my habit to attempt to correct irregularities in the temporary teeth. I feel that all I can do is to correct the irregularities of the permanent teeth when they come, and I can have better help from the child at that time. It is rather an uncertain operation to undertake, as Dr. Tracy has said, and I have not felt justified in undertaking it. I have been perhaps in general a little late in my attempts at correcting irregularities of all kinds—sometimes too late. I have taken up the newer practice advocated by Dr. Angle, which calls for earlier attention, and I presume in the future I shall be more prompt in correcting irregularities in young people than I have been in the past. I think Dr. Angle has opened up a way which leaves us very little deviation. I have felt even before I saw the statement made in his book, that the first necessary step in the correction of irregularities for young people is to see that the first molars articulate correctly—that is, the lower posterior half of the first permanent molar articulates with the anterior half of the upper. It is comparatively easy to get those in line if you take them first. It behooves us to guide the incoming first molars to their proper places. I think that is the most important step at that age that we can undertake. If we guide them so that they can articulate in their proper places, we need not have so much fear about the others. Nature has set the pattern; I think Dr. Angle is the first one who has made that clear. Sometimes I have tried to do that by pushing certain teeth back rather than expanding the arch. I presume that the expansion of the arch in most cases is the best way. When I was a youngster and began my work on the correction of irregularities, I was taught to use that same idea, although it was then a flattened band of gold rather than a half-round wire, and it was placed around the arch in the same way, but tied with strings. No one thought at that time of making any attachment to the permanent molars. Wires in the place of strings were undreamed-of at that time. There is one gentleman in this city—now a gray-haired man—for whom I began, and I can remember as if it were yesterday, the task of tying those two bands on the upper and lower jaws in such a manner as to get the outward spring of the band. It made the gums very sore, and I can remember the great welts of swollen gum tissue; but my preceptor persisted in that method, and I followed his directions, and the teeth were straightened in practically the same manner as now advocated by Dr. Angle, although with nothing like as much celerity or comfort to the patient.

In those days there was a prejudice against it, perhaps on account of the discomfort to the patient. I have always been ready to adopt an easier way for the patient, and my plan was what might now be called the old-fashioned way of using the rubber plate with screws, or the split plate, using piano wires that could be stretched. I think about 1880 I regulated or expanded a good many arches in that way. It is very evident that the Angle method is the most certain and most accurate, and possibly the most comfortable for the patient, although I still think I can get the result as comfortably for the patient—yet perhaps not as quickly—by the old way as by the Angle method.

There is one great point gained by the Angle method, namely, the fixture is put in so that it cannot be taken out. There is not the temptation to wear it in the pocket instead of the mouth, which is always a danger. Of course, if patients do that the work is retarded. If the fixture is put in in such a manner that it cannot be taken out, its work will continue, and the patient will endeavor to have it over as quickly as possible. This is a little wide of the sense of the paper, but I was tempted into saying it.

Dr. Dailey (closing the discussion). The point which I endeavored to bring out tonight more particularly—other than the typical malocclusion of deciduous teeth as compared with the typical malocclusion of the permanent teeth—was the necessity for the correct interproximal spacing of the deciduous teeth for the proper eruption of the permanent teeth into their places. If the space has not been made of sufficient width, the permanent teeth cannot erupt properly; they will erupt into malocclusion. The necessity for that spacing, and observing the position into which the permanent teeth will eventually erupt, is one of the main features I present tonight, and I wish to call it to your attention. It is of far greater importance than men have in the past recognized. I do not claim that it is a new idea, but I want to create interest in that branch of the subject.

Another point is that the lateral halves of the arch—deciduous first and second molar—move mesially and close the space that should be between the deciduous central and lateral incisor, and also the canines; and when the upper central or lower central erupts, there is not sufficient space to allow it to erupt in its proper place, due to the mesial movement of the buccal teeth. By comparing casts, you will find that the normal lateral halves of the arches will be of sufficient width to allow the permanent canines to erupt if the space is maintained. If it is deficient it should be increased to allow the permanent teeth to erupt into their proper places. If you are in doubt as to the size of the teeth that are to come there, it is very easy by means of the X ray to ascertain their size.

Adjournment.

Wm. B. Dunning, D.D.S.,
Editor N. Y. Odontological Society.

CONNECTICUT STATE DENTAL ASSOCIATION.

Annual Convention, New Haven, Conn., April 18 and 19, 1905.

(Continued from page 1369.)

The Clinics.

Dr. C. Frank Bliven, Worcester, Mass. "The Correct Adaptation of Upper Dentures."

After a perfect impression has been obtained, examine the mouth for the hard places the plate is likely to press upon when in use, and cover the impression sufficiently to relieve the pressure. Proceed to pour the model, and after separating, examine the mouth for the soft places, carving sufficiently to permit the plate to rest firmly upon the tissues. The result will be a plate that will fit the mouth when in use, if the other features necessary to a perfectly constructed plate are executed.

Dr. W. S. Payson, Castine, Me. "A Positive Anchorage for Alloy Fillings."

The sulci of the bicuspids and molars are cut out and a double-headed, brass, gold-plated wire No. 38 is inserted in the sulcus and body of the filling completely covered by the alloy. The distal end of the sulcus from the filling is enlarged a little, and one head of the rivet is placed in the enlargement, the other head being in the body of the filling. This makes a sure anchorage and conserves the maximum amount of tooth-structure.

Dr. G. H. Leggett, New York, N. Y. "Using Rubber Teeth as Removable Facings in Bridge Work."

The shoulder of the tooth is first ground off and a backing adapted to the tooth, the holes being large enough to clear the heads of the pins easily. The backing should be of 22-k. plate, No. 30 gage. A depression is then made in a piece of pure gold with a ball-pointed burnisher, which depression acts as a trough for the pins when the backing and tooth are in place. This piece of pure gold is then burnished down and trimmed, and together with the backing is placed on the tooth. The backing and the pure gold plate are tacked together with solder, replaced on the tooth, and the tooth set up on the model, after which the facing is removed, and the bridge is invested and soldered. The facing is then cemented to position with Evans cement. The clinician claims the advantages for this method are that one has a larger assortment of teeth to select from; the facings do not go through the fire; heavy tips can be put on if necessary. The facings, when broken or lost, are easily replaced by any dentist, and no special tooth is required. The color may be very much modified by the cement used.

Dr. Stephen Palmer, Poughkeepsie, N. Y. "Unique Porcelain Operations and Their Results."

1. Immediate correction of irregularities by the aid of porcelain veneers. The clinician showed models demonstrating each step of this method, and asserted that in one case of this kind the teeth are as firm and perfect as the day the operation was completed.

2. Repairing of two porcelain teeth upon a continuous-gum denture. The central and lateral teeth were fractured diagonally, and the original length and contour restored by building up with inlay material, and in that way saving time and risk of removing the fractured teeth and replacing new, and has proved equally as durable.

3. Construction of a porcelain post crown upon an irregularly broken-down root, where the root of a lateral is broken diagonally with one side at least three-sixteenths of an inch above the gum margin. This piece was still in perfect condition after four years of service, and saved sacrificing either a perfect central or canine for supporting a small bridge.

4. A porcelain crown constructed over a remaining firm post of a fractured Logan, thus avoiding the removal of the post and weakening of the root in the operation, as is often the result.

5. Porcelain veneers as used to restore uniformity of shade of two conspicuously discolored teeth. This was illustrated by models showing each step in the operation, but the clinician says that the satisfactory result can only be appreciated by an examination of the completed case as represented in the mouth.

Dr. F. W. Proseus, Rochester, N. Y. "The Land All-Enamel Jacket Crown Made from Impressions and Dies."

My first attempts were made by taking impressions of the prepared tooth. Cement thoroughly incorporated with soapstone was used, the tooth being previously wiped with a thin coating of vaselin. I found this method very good in certain cases, especially where the prepared stump was not too long. In cases of molars and bicuspids where undercuts are present it is impracticable to get good impressions with cement, and modeling compound is employed, with results fully as satisfactory and with saving of time. The tooth is prepared as described in the Dental Cosmos for 1903, vol. xlv, page 444. A snug-fitting German silver band is made for a Richmond crown, but extending slightly above the sides of the root. The band must be made with straight, smooth sides to avoid undercuts which would break or draw the impression material. The object of the band is to define the circumference and force the impression material about the root. With the band in place upon the root the impression is taken. If with cement, place matrices at adjoining teeth and see

that the bulk of the cement does not interfere with the occlusion. The bite is then taken with modeling compound, cooled and removed. The impression should come away with sharp, clear edges. Place in the compound with the band. A ring one-half inch high of unvulcanized rubber is formed about the cement and band, and a die of Melotte's or fusible metal poured into this. The rubber is then removed and a plaster cast is run. In using modeling compound the band is placed in position and a well-warmed piece of compound is used, and pressure made with the thumb and fingers to force it firmly to place until set. It is then thoroughly cooled and a bite is taken with another piece the surface of which has been heated over the flame to produce adhesiveness. After cooling and removing, amalgam, rather soft, is pressed into the space within the band and plaster model. The matrix is made and the jacket completed entirely independent of the patient. By this method a great saving of time is assured, and should the jacket become checked or broken there is no annoyance to the patient in making the second one. Also after the first baking the matrix is replaced upon the model and the body firmly pressed in, then carved to the desired shape, thus giving stronger porcelain than is produced by flowing and tapping to place.

In making the larger posterior molar jackets, first make a matrix of thin metal, not being especially particular about its accuracy, and over this on the die press the body and carve to shape and biscuit to slight glaze, strip out the matrix, then form a true-fitting matrix and into the partly formed jacket place quite wet body, and press firmly to place. This saves time and overcomes warping, and assures a true joint.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

Thirty-seventh Annual Meeting.

(Continued from page 1375.)

FIRST DAY—*Evening Session.*

(Continued.)

The next order of business as announced by the President was the reading of a paper by Dr. I. N. BROOMELL, Philadelphia, on "The Dental Contents of a Dermoid Cyst." [This paper is printed at page 1412 of the present issue of the COSMOS.]

Discussion.

DR. WM. CARR. I feel that I must congratulate the society as well as the essayist upon this paper. It is extremely valuable and of great interest from a scientific standpoint. It reflects great credit upon its author and shows profound thought and careful research. It will in my opinion prove a valuable addition to the literature on the subject. I have read it with pleasure, and will give it most careful attention, although I have not yet been able to give it the consideration which it deserves. I notice that it contains much that is new in histological data, and must confess that I am not histologist enough to discuss the paper without preparation. In all my experience I have met with but one case of this character, and that during my course as a medical student.

His observation regarding the long slender teeth which current literature has considered to be without pulp-cavities is very interesting, and I must admire the emphatic exception which he takes to the general impression, basing

as he does personal research and study. Too often men make assertions from theory; but in this instance the essayist seems to have demonstrated that they do contain pulp-cavities.

Dr. Ottolengui. We have had a peculiar evening. We have had addresses by scientists to the plain people, and from the practitioner's standpoint many may be inclined to think that these papers are only theoretical and scientific, and not interesting to the practical man; but, gentlemen, there has never been a really scientific paper written that is not of tremendous interest to the practical dentist, because the practical is based upon the scientific.

In the paper by Dr. Buckley we are not only given the science of the subject, but he has opened up the practical application thereof. Now we have had a paper on dermoid cysts, and it will be my effort to speak on the subject from the standpoint of the plain dentist who does not know the scientific aspect of this subject, but who sees the bearing of this work upon the practical work of the busy dentist. I will not only refer to the paper which the essayist has just given us, but also to a paper which has not yet been written. In the first place I wish to call your attention to one thing that I noticed in the pictures thrown on the screen tonight. Some of the gentlemen present had the pleasure of hearing a paper by Dr. Black this winter, in which he showed on the screen a number of beautiful slides of carious teeth, and in a great many of them he called attention to the dark lines which passed from the carious outer surface always toward the pulp. He admitted that it was difficult to see these in the specimens with the microscope, but they invariably appeared in the photographs and were discernible on the screen, and while he did not make the assertion, he left the impression that this infected zone indicated the extreme depth to which the carious process affected the area beyond. We have seen on the screen tonight pictures of teeth that have never been in the mouth, and in these we have exactly the same shadows as we saw in the others. And that is what I mean by discussing a paper that has not yet been written. I know that Dr. Broomell is not only a good writer but also a magnificent photographer, and I would ask Dr. Broomell to study the pictures of Dr. Black and settle that point, namely, the depth to which the infection penetrates into the dentin we are to treat. If that can be demonstrated as a fact, then we must go back to Dr. Buckley and ask how to disinfect not only the dead but likewise the living tooth.

The other point that I would bring out in discussing the unwritten paper is this. A point of tremendous importance to us, and one not yet settled by the histologist, is the vascular supply of the pulp. We have been told by Dr. Rhein and others, that when we extirpate a pulp we divert the pulp-nutrition toward the pericementum. That presupposes that there is a direct connection between the vascular system of the pericementum and that of the pulp, and by taking this supply away from the pulp an extra amount of blood enters the pericementum. We are told that these teeth are very vascular, and that they are just as vascular at the extremity as at the periphery. It seems to me that in this conglomerate mass of tissue it will be of interest for Dr. Broomell to get into communication with the blood supply at the periphery of these pulps and discover how the blood passes into these teeth. Dr. Williams experimented along these lines and as the result of his investigations stated that he was not certain as to the course of the bloodvessels, but theorized that the supply came from a Y-shaped vessel—one branch entering the pulp and the other the pericementum. That is sufficient to sustain Dr. Rhein's theory that if one be cut off the supply will be diverted toward the other. It seems to me it is going to be an exceedingly valuable series of experiments to determine the means by which the blood reaches these parts and possibly discover what

some other histologists are theorizing about. I wish to compliment the essayist upon the unique situation in which he finds himself.

It is not known to me that anyone has ever before attacked the dermoid cyst from the histological standpoint, and it is an honor to this society that we have received the first message on this subject, and I hope the second message may be presented to the same society.

Dr. I. Hart. I think I can appreciate the immense amount of labor involved in preparing the material the essayist has presented tonight, and in congratulating the society I feel personally indebted to Dr. Broomell. Two questions occurred to me that I would like to ask Dr. Broomell to reply to in closing the discussion. One is, being of a dermoid origin, how does he account for these so-called dermoid cysts being found in the uterus? and the other question is, are these united teeth merely fused teeth with a commcn pulp, or have they separate pulps?

Dr. Broomell (closing the discussion). I am indeed very grateful for and appreciate the discussion so far as it has gone, and I am also pleased that some questions have been asked. Dr. Ottolengui referred to the question of the blood supply, and I suppose he referred to the blood supply of developing teeth. In regard to that I would say that the blood supply of developing teeth is rather complex, that is in teeth that are not fully calcified, in which case the ends of the roots are spread across by a thin vascular membrane, no doubt a portion of the developing peridental membrane. There appears to be no direct blood supply to the ends of the roots. All of the blood supply in these teeth as well as in all young teeth appears to be through the dental follicle rather than by direct blood supply from an artery of the jaw. The investigator must meet disappointment when he expects to find the blood supply coming from individual arterial branches into the various roots, because in the beginning that is not true —the blood supply is all from the dental follicle.

Dr. Hart asks why are these cysts found in the ovary. That may be answered by saying that they are no more liable to be found in the ovary than they are to be found on the scalp, face, or chest. As I said in the beginning of the essay, the growths are the result of a few imperfect cells separated from their normal location; they become surrounded in a certain locality, and if the development is not interfered with they multiply and continue to develop. They do perhaps appear more frequently in the ovary than in any other place, and are certainly larger when found there.

Dr. Hart also asks regarding the condition of the pulps of these fused teeth, whether they have a common pulp or whether they are fused teeth or complex teeth with a common pulp or whether they have each a separate pulp. I would say in reply that this is a class of teeth that I would designate as complex teeth rather than fused teeth, and the pulp is a common pulp extending to the different parts. In those teeth which are actually fused a certain amount of calcification has taken place, and the pulps are separate and distinct.

In concluding, I would like to summarize briefly to this extent. I believe that it has been established now that the development of teeth in dermoid cysts is a continuous process. This I believe had never before been asserted. Second, the incomplete condition of the enamel occasioned by non-eruption of the teeth. Third, the incomplete condition of the root apices, occasioned no doubt by the same cause. Fourth, the absence of a cementum in those teeth without bony surroundings. Fifth, the presence in all instances of a central pulp-cavity. Sixth, the structural variations in the hard tooth tissues.

There yet remain to be considered—and I hope to be able to throw some light upon—the following points: (1) The presence and character of an alveolodental membrane in those teeth sur-

rounded by bone. (2) The nature of the membrane surrounding the roots of teeth imbedded in soft tissue only. (3) The presence of a true gingival tissue. (4) The probability of a destructive process in the roots of the teeth, corresponding to decalcification in the roots of the deciduous teeth.

On motion the society adjourned until the Saturday morning session.

(To be continued.)

PENNSYLVANIA STATE DENTAL SOCIETY.

Thirty-seventh Annual Meeting.

THE thirty-seventh annual meeting of the Pennsylvania State Dental Society was held in the Clover Room of the Bellevue-Stratford Hotel, Philadelphia, June 27, 28, and 29, 1905.

TUESDAY—*Morning Session.*

The first session was called to order by the president, Dr. I. N. Broomell, Philadelphia, Tuesday morning, June 27th, at 10 o'clock.

The meeting was opened with prayer by the Rev. John Harvey Lee, Philadelphia.

The president, Dr. Broomell, in introducing the Hon. John Weaver, Mayor of Philadelphia, made a short address.

Mr. WEAVER, in welcoming the society to the city, spoke in part as follows:

Mr. President, Ladies and Gentlemen, Members of the Pennsylvania State Dental Society,—In behalf of the citizens of Philadelphia I welcome you to the City of Brotherly Love. It seems too that this is a very appropriate place for the state dental society to meet. How many great dentists have gone out from the city of Philadelphia and the state of Pennsylvania to all parts of the world! I was reminded this morning as I was leaving my office that one of them that left here many years ago and amassed a great fortune—I mean a great fortune from the dentist's point of view, of course [laughter]—lived for many years in one of the great cities of Europe, and when he made his will he did not forget his native state of Pennsylvania. Let me read to you a short clause that he put in his will, which I think will be interesting to you: "As to the Dental Institute, I desire it to be conducted in a way *en régime* as such institutions of learning are conducted in Philadelphia and not inferior to any already established. I direct that the said corporation shall apply so much of the remaining income and profits of my estate as shall be necessary to successfully keep, maintain and carry on, and improve the same and render it the more important; and if there should be a surplus of income after paying all expenses, remunerations, and salaries, I request said corporation to apply the said surplus to the education of such deserving students of dentistry in my native state of Pennsylvania as it deems best and as advantageous to help striving boys to get their education."

Such were the words of Thomas W. Evans, who directed that his property at Fortieth and Spruce streets should be turned into a museum and dental institute. You may have forgotten the fact that there was such a project on foot, but I want to say now to you gentlemen that we have sent one of the city solicitors to Paris with instructions to conclude the litigation going on against the car-

rying out of the provisions of this will, and turn the money over to this corporation whose duty it is to establish this dental institute and museum, and I hope if you gentlemen are here again after two or three years—because I recognize the fact that you must meet at other places, Williamsport, Pittsburg, Wilkes-Barre, etc., from time to time—that perhaps by the next time you meet in the city of Philadelphia you may be able to go out and see the Thomas W. Evans Museum and Dental Institute. And so I could go on calling your attention to a great many distinguished dentists who have gone out from the city of Philadelphia and the state of Pennsylvania.

I want to say again, Mr. President, to every one of you, that I give you a most hearty welcome to this city—the City of Brotherly Love, the city of Liberty, the city where the Declaration of Independence was made. I give you a hearty welcome and would say, If there be anything I can do as chief executive of this city to add to the pleasure of the society and the members here, you have only to suggest it to me and it will be done. I am quite sure that it won't be necessary to say anything to the police department of the city while you are here [laughter]. I must say before closing that I am glad to see the ladies here. If you have my experience, you will come to the conclusion that you will never have an enjoyable trip from home unless you have your wives with you. Of course there are many who have no wives; all I can say to you is to get them as soon as you can, and carry them with you when you go away from home. [Continued applause.]

The first regular order of business for the society was the reading of the minutes of the previous meeting.

Dr. Root moved that the reading of the minutes be dispensed with as they had appeared in printed form in the Transactions.

Motion carried.

Dr. Broomell called Dr. Jameson to the chair to preside during the reading of his annual address as follows:

President's Address.

Several years ago, the dentists of this state, actuated by a desire to elevate the standard of their profession, and a conviction of the many advantages to be derived from literary and scientific institutions, organized themselves into a "society of the commonwealth" which assembles today for the thirty-seventh time—and to these deliberations I bid you a most cordial welcome.

In obedience to a long-established and time-honored custom, and independent of this, I am expected as your presiding officer to present for your consideration such matters as pertain to the welfare of the society and to the good of the profession at large.

Organized upon the principle of mutual interest, the Pennsylvania State Dental Society has lived and prospered, and during its existence has been instrumental along with similar organizations in establishing a professional dignity the importance of which compares favorably with that of medicine and surgery. Having acquired this estimable position, we may properly consider some of the essentials to maintain it. Dentistry is a progressive science, and he who fails to keep acquainted with its improvements grossly fails in his obligations to those who may come under his care. There is no good reason why any dental practitioner of the present day should cling obstinately to the past. The present advanced and prosperous condition of the arts and sciences in general not only contributes to the acquirement of varied and useful knowledge relative to our special branch, but it also serves as a stimulus to new discoveries, which in time may bring greater achievements in our sphere of usefulness.

The practice of dentistry, like that of the mother profession, medicine, is a capital that must be worked with

brains. Knowledge is power. It moves alike the individual and the assemblage; it pierces the sky and extracts the lightning from the heavens; it wires together the nations of the earth, and sends the message from shore to shore; it builds railroads and ploughs the ocean with palatial steamships—it does all this, and it does more. It finds remedies for our mental and physical ailments, and "ascends to the very footstool of Deity in search of a new life and new home beyond the grave." Notwithstanding all this, man is naturally lazy, and it is only the stimulus of necessity or ambition that will make him toil, and these coupled together are found by experience to be wonderful factors for good.

Perhaps no other profession develops the better qualities of man to a greater degree than does our own, and it is this that serves us as our stock-in-trade. Our work is an arduous and in a sense a noble one. While it does not bring with it the widespread fame or the material results of many other callings, and however inferior it may seem when compared with the brilliant achievements of mental work applied to questions of public importance, this much is certain, it is invariably performed for good. The professional work of the soldier has a great and lofty purpose, but "his path of duty, his aspirations of glory, lead over the graves of thousands." His work is that of stern necessity. Upon the professional work of the statesman we all look with admiration, and history records his name and deeds, but it is doubtful if his acts always agree with the dictates of morality and justice. The lawyer in his professional work becomes acquainted with nearly every phase of human nature—he understands its strength and its weakness—but how often is he compelled to defend much of what he knows to be doubtful and untrue; but in the practice of a medical specialty there can be no object other than the betterment of the physical condition of human beings. With us, the opportunity does not arise to do evil to one person or class of persons that through this good may come to others.

It is true that we have inherited much from our forefathers, but, notwithstanding this, the last half century has added as much if not more to our store of knowledge than all former years combined.

While our thoughts and work should center of course on subjects relating to our profession, we should also keep pace as well as we can with the "progress of the various sciences and the polite literature of the day." Again, we must not only contribute, but we must be busy readers, and see to it (if the habit is not already acquired) that we look to dental journals with avidity and examine new publications with a keen relish. But to continue the success which has already been accorded our profession, and to elaborate this, we must be something more than contributors and readers. We must be active thinkers and sifters of knowledge, and profit by the counsel of Bacon, to carefully weigh and consider all that we read. But reading, no matter how carefully done, is but one phase of professional culture. We may profit much from conversation, still more from observation, and the more we attempt to learn by observation, suggested and enlarged though it may be by reading, the better for our mental training, the better for our higher professional life. All of this therefore means observation. Observation begets thought; thought brings forth a desire for investigation, and by investigation our own knowledge as well as the boundaries of our science are enlarged.

I have said that ours is a progressive science, and in order to be progressive we should believe in the things and methods of the time in which we live, and take an interest in these. While we should not too strongly discourage, but rather encourage the introduction of new remedies, the results from the use of these should be carefully studied and recorded. We should accept nothing for granted, especially to the extent of con-

fiding the same to the laity. Apart from the personal chagrin to the operator, the far-reaching injury to the profession resulting from a promise to cure which fails, can hardly be overestimated. With equal force, the same remarks apply when impossibilities are attempted in mechanical and technical procedures.

While I have no desire to discourage those who desire to devote their time and attention to the production and perfection of remedial agents, I believe that possible damage may result by a too ready acceptance of new and untried remedies. We recognize that everything around us changes from time to time. Climatic and atmospheric conditions, and these modified by the presence or absence of the morbific cause of infectious diseases, call for a corresponding modification in regard to general medical treatment. We also know that to a great extent pathologic conditions within the oral cavity are caused or at least strongly influenced by constitutional disorders. It is therefore essential that our method of treatment and our remedial agents should be different from those of days gone by. Notwithstanding all this, and admitting that new remedies are a necessity, and while we should always gladly welcome their appearance, in order to sanction them we must be studiously careful, and in experimenting with the same we should never endanger in the least the interests of our patients.

I have often wondered if much damage does not result from the tendency which may be among us to attempt to do impossibilities. We should be quick to distinguish between what can and what cannot be done. In all cases of doubtful diagnosis, uncertainty respecting proper treatment, or when a fatal termination is feared, the physician avails himself of the aid and counsel of his fellow practitioner. In like manner, consultations should constitute an important factor in the direction of an invaluable aid to *our* success. The consultation of the dentist must of necessity differ from that of the physician. It need not be a hurried consideration of symptoms and signs, followed by heroic treatment, but instead of this it may be a deliberate weighing of the facts, and this should be and I think is the primary function of most dental societies. It is chiefly at the meetings of these organizations that our consultations take place. The self-sufficiency which fails or disdains to avail itself of such aid and cooperation as that furnished in the form of consultation through dental societies or otherwise is justly amenable to censure. Such consultations can never do injury; on the contrary they are calculated to inspire renewed energy and better judgment.

Next in importance, if not of equal import to the benefit to be derived from society gatherings, is that obtained from a careful consideration of the proceedings of these meetings, together with dental literature in general. That the success of this may be maintained to make it a potent factor for good, three things are necessary—reading, investigating, writing. The scientific and far-reaching dentist does not confine himself solely to the routine of an everyday practice, but on the contrary strives to make himself acquainted with the causes of conditions and the reasons for methods. While we are the legitimate heirs to an accumulated experience, and while we practically owe our professional existence to this, ours is a trust which must not be transmitted to our successors unimproved. Every one of us may contribute something to the general stock of knowledge—some observation, some fact that may if properly applied assist in solving questions long unsettled.

A subject that might perhaps pertain to our professional welfare is the growing tendency to specialize. While in a sense this is to be encouraged, yet it is a possible cause for apprehension. Our field of action is too limited to permit of much subdivision. If there are those among us who are impressed with the belief that they can serve a better purpose by devoting themselves to some

special line of work—and in a sense this is desirable—let them not forget that there is but one science of dentistry, that sanctioned by experience, and that this especially applies to general practice, and with this we should always keep in close touch.

Another matter of importance is that of a due consideration for hygienic conditions in the oral cavity. In no other line of dental work is there a better opportunity to assert our importance and to increase our professional worth.

Oral hygiene can be practiced in three distinct ways: first, results by direct operation from our hands; second, that which results from personal care, and third, by education—by placing before our patients such information as will instruct in methods and engender a belief in principles. We must consider that to a great extent the community appears blind to the importance of health in general, and no better informed in regard to the laws which govern and the good which follows oral cleanliness. It is seldom that we have an opportunity to declare ourselves in public, but in our capacity as personal advisers we should impress the importance of these laws upon those under our care.

From the rapid progress made by our profession during the last half-century —a period prolific in discovery, enriched by improvements and stimulated by a recognition never dreamed of—one might almost be led to suppose that little or nothing remained to be done. Instead, the very reverse is true. Up to this time we have but completed the foundation of our science. The superstructure yet remains to be finished. There are many things unexplored, and even undiscovered, and these are as rich in value and as important in practice as many now understood. With the exception of descriptive and surgical anatomy and certain procedures that are purely mechanical, there is not a single branch of the dental art that does not offer inducements for additional research and further inquiry. Few persons, even among those well educated—those most highly enlightened—really know what dentistry is. We are too often looked upon as tradesmen, mechanics or artisans. Few are aware that ours is a profession requiring study, research, a high order of intellect, and careful training. The dentist qualifies himself only by hard work and long-continued effort, and the laity should be taught to understand and appreciate this fact. It has been said that "the character of a profession is but a reflex of the civilization of the people of which it is a part," and this is as true of our own profession as of general medicine or the law. It has been observed that life will always be to a great extent what a man makes it; and in a like manner when a body of men combine, as in a profession, that profession becomes exactly what its members please to make it.

Your indulgence is asked while some matters pertaining directly to the welfare of the society are considered.

STANDING COMMITTEES.

I wish to call attention to those clauses in the by-laws which define the duties of committees, and suggest that the chairmen of the various committees acquaint themselves with these, so that their full meaning may be carried out at this meeting. While the by-laws do not provide that the State Society shall have a report from the State Board of Dental Examiners, I believe that provisions for such a report should be made, whereby a tabulated record of the work of this body would appear in the printed transactions of this society, as well as in the annual report of the state Dental Council where it now appears. Article III, section 8 of the by-laws reads as follows: "Honorary members shall consist of persons who have made valuable contributions to the science and art of dentistry, or who have rendered an important service to the profession." At the present time this list contains but

two names—an insufficient showing. It is difficult to believe that in this state, justly recognized as the home of dental training and dental learning in America, there are so few who are entitled to the distinction of honorary membership in this organization. In order that this apparent oversight may be rectified, I suggest that a committee be appointed for the careful consideration of the subject, and that they report the result of their deliberations at the next annual meeting. The interest and usefulness of the society could no doubt be enhanced by certain additions to the number of standing committees. The creation of a committee on scientific research would be advisable, because the reports of the work of such a committee, properly conducted, would furnish a synopsis of the progress being made in this direction, and serve as a valuable adjunct to the published transactions. Furthermore, a committee on practice would afford a means by which members of the society could keep in touch with new and accepted methods without the usual necessity of devoting a considerable time to the perusal of lengthy contributions to obtain this knowledge. At the last annual meeting a committee on membership was added to the list of standing committees, and as the present as well as the future welfare of the organization depends upon its membership, the importance of this committee cannot be overestimated. Admitting this, the committee on membership should consist of representatives from all parts of the state, and especially from many or all of the local societies in the state. This committee thus constituted should be able to bring about a decided increase in membership within the next few years.

Recent experience has proved the necessity for more extended work upon the part of the Board of Censors. As primarily constituted and as its name implies, one of the duties of this committee should be to examine into the character and worth of all papers to be presented before the society. The wisdom and advisability of calling attention to this is apparent when it is considered that one of the chief reasons for the delay in the publication of the bound copies of the proceedings of the last session was occasioned through the persistent efforts upon the part of an over-enthusiastic essayist to have expunged from the records certain passages which after being more fully digested appeared to him as injudicious. Neither the publishers nor the publication committee have vested in them the authority to grant such a privilege, nor would it be wise to clothe them with such power. The Board of Censors, by a proper exercise of their function, could abort any questionable features contained in essays, and thus avoid the embarrassment which usually follows an injudicious act.

It is with a great deal of pride that I call attention to the work of the executive and exhibit committees in providing for and inaugurating this the largest and without doubt the most attractive dental meeting ever held in this state. The amount of work necessary to perfect the arrangements for such a meeting is no trifling matter, and to have successfully accomplished such an undertaking reflects great credit upon the gentlemen who have had the work in charge. Personally, I feel very proud to be privileged to preside over such a gathering, and I am going to take advantage of the situation and extend to the committees on behalf of the gentlemen who have come here, a generous vote of thanks.

DISTRICT SOCIETIES.

I believe that there should be a closer relationship existing between the various local societies throughout the state and this society, which should be looked upon as the parent organization. It would be profitable to imitate some other states in this regard. The plan adopted in New York state is an admirable one, being arranged in such a way that the various local societies—or district societies as

they are known—report a synopsis of their deliberations and their status regarding membership, etc., to the state society. This being included in the published transactions not only establishes a closer relationship between the state and the subordinate organizations, but it affords a volume of ready reference regarding the profession in all parts of the state.

An important move was recently made in the direction of reorganizing the Illinois State Dental Society, involving many radical changes in the method of organization heretofore prevailing. The complete reorganization of that society was deemed expedient because all efforts toward professional betterment, especially that pertaining to dental legislation, "were treated with ill-disguised contempt, ignored or granted with evident reluctance." All this was attributed to the need of organization. The plan adopted in Illinois which is likely to prove successful, is as follows: "County societies are being formed in every county in the state where there are enough dentists to do so. These county societies are to be the component parts or branches of the state society, and to be the only avenue through which to become affiliated with the state society. That is to say, under the proposed plan, barring a few necessary exceptions, direct admission into the state society is no longer possible. Application to the county society having jurisdiction is a prerequisite, and good standing therein carries with it membership and good standing in the state society. On the other hand, suspension or lapse of membership in the county society also cuts off membership in the state society. The component society is, therefore, practically the state society's membership committee, always, of course, subject to revision by the state society, to whom appeals may be made. To illustrate this from the methods prevailing in fraternal organizations: The state society is the grand lodge, and the county societies are the local lodges, who pass on the qualifications of candidates and admit to membership, and who send their annual report with grand lodge dues for each member to the secretary of the grand lodge at stated times."

I believe that the weakness in the Pennsylvania State Dental Society results from a want of thorough organization. While its membership is in a measure representative of the better element of the profession it is not representative as to numbers, and on this account its power for good has been seriously hampered.

PUBLICATION OF TRANSACTIONS.

For the past two years the transactions of the society have been sent outside of the state for publication, an unreasonable and injudicious act upon the part of the council. When this change was brought about, the argument used in favor of doing so was that under the old arrangement the work of printing and distributing the transactions was not sufficiently prompt to warrant a continuance. Inasmuch as the new arrangement has failed to be an improvement over the old, and in consideration of the fact that the work can be and should be done within the confines of our own state, I must earnestly suggest that the committee be instructed to arrange for the publication of the transactions at home and, if deemed advisable, under our own auspices. The publication committee, whose duty it is to superintend the publication and distribution of such portions of the transactions as may be considered of sufficient value, should be given the full power to make provisions for the proper conduct of this work in advance of the meeting, thus avoiding much of the embarrassment incident to these arrangements experienced during past years.

DENTAL LEGISLATION.

During the past year a new dental law has been drafted and, under the fos-

tering care of the legislative committee, passed the legislature, but finally failed through the governor's veto. In his refusal to sign the bill, the governor gave the following as his reasons for so doing:

> Section 18 provides that "any person who shall violate any of the provisions of this act shall be guilty of misdemeanor, and upon conviction shall be punished by a fine not exceeding five hundred dollars or by imprisonment not exceeding six months, or both by fine and imprisonment at the discretion of the Court." One of the provisions of the bill is contained in Section 5, and is to this effect: "From the list of nominees, the governor shall annually during the month of August appoint successors to those members whose term of office shall expire on the first day of September of each year." These sections are brought into juxtaposition in order to show the futility of trying to make every conceivable breach or neglect of duty a crime punishable by imprisonment. In our legislation it is growing to be a habit, and it is full time that this tendency be curbed. For this reason, an otherwise carefully drawn bill for a proper purpose meets with disapproval.

While this is to be deplored, it must be understood that the failure of the revised law to secure executive approval does not affect the dental law of 1897, which is in force, and remains operative in all its provisions. The need for dental legislation is without doubt the paramount question before the profession in the state today. While the present legislative act regulating the practice of dentistry in this state was unquestionably one of the best at the time of its enactment, it is deficient and inadequate for our present needs. The fact that past efforts in the direction of a revision of the law have failed should not discourage those who have labored so earnestly in this direction. Legislation of whatever nature is obtained only through a concerted and united effort upon the part of those who expect to be benefited by such action, and a failure to realize this is undoubtedly responsible for the defeat of the proposed law of 1905.

As at present constituted, the Dental Council of Pennsylvania is composed of three members—an insufficient number. It is the duty of the Dental Council to "Supervise examinations conducted by the State Board of Dental Examiners, of all applicants to practice dentistry in this Commonwealth," to see that said examinations are conducted in harmony with the provisions of the state law, to issue licenses, to receive and consider applications to practice in this state from those who already enjoy the privilege in other states. These, together with other matters of vital importance are sufficient to warrant an increase in the membership of the council, as provided for in the recently defeated act.

Not only should the membership of the Dental Council be increased to five, but the term of the length of service of the dental representatives should be extended so that it would correspond to that of the state officials who are members of the council. The wisdom of such an arrangement would soon assert itself, and it is already apparent to those who have for a brief period served in this capacity.

Any reference to the Dental Council would be incomplete without mention being made of the valuable services rendered by the Superintendent of Public Instruction, Dr. N. C. Schaeffer. Only those who have had the privilege of membership in this body and thereby come in contact with Dr. Schaeffer know how much the profession in this state is indebted to him for his untiring efforts to assist in matters pertaining to dental education and dental legislation. Early and late he has given time, thought, and energy, and through his efforts we are soon to receive a material betterment in the form of a commodious room in the new capitol building at Harrisburg, exclusively for the use of the State Dental Council and for its records. During our deliberations I trust that some action may be taken whereby Dr. Schaeffer may be made to know that his efforts on our behalf are not without appreciation.

During the past year, dental literature has been enhanced by many valuable contributions from the leading men in the profession. From a practical

standpoint the subjects of porcelain restoration and orthodontia have perhaps received the greater attention. Prophylaxis and therapeutics have been well and advantageously discussed, while oral surgery, especially that diagnosed by the aid of the X ray has made definite and satisfactory progress.

The year has produced the usual additions to the list of dental text-books, notable among which are Professor Inglis' revision of Burchard's "Dental Pathology and Therapeutics," and the second edition of Professor Warren's "Mechanical Dentistry and Metallurgy." These together with the forthcoming revised edition of Professor Guilford's "Orthodontia," will make a very creditable showing from this society, which has always been in the front ranks in matters pertaining to dental education and dental research.

I wish that time would permit me to dwell upon the details of the meeting which you have come here to attend, to speak of the educational feast that is to be spread before you, and of the benefits to be derived from the social intercourse always a feature of such gatherings. But this I cannot do. It now only remains for me formally to declare the thirty-seventh annual session of the Pennsylvania State Dental Society open for the transaction of business, and for the consideration of such scientific matters as are to be brought before it.

Motion was made and carried to adjourn until the afternoon session.

TUESDAY—*Afternoon Session.*

The Tuesday afternoon session was called to order promptly at 2 o'clock by the president, Dr. I. N. Broomell.

The first order of business was the reading of the minutes of the morning session by the secretary, Dr. Cupit, which were approved as read.

Dr. CUPIT then read a special report of the council meeting held in March, and also a report of the morning meeting.

Next order of business was the report of the Board of Censors.

The President next called for the report of the Legislative Committee, which was presented by the chairman, Dr. F. D. Gardiner, Philadelphia.

The President then announced as the next order of business the reading of a paper by Dr. N. C. SCHAEFFER, Harrisburg, on "The Action of Examinations," which was as follows:

THE ACTION OF EXAMINATIONS.

When I was invited to address the Pennsylvania State Dental Society, I accepted the invitation without hesitation, because in my judgment the time has come when the professors in dental colleges, the members of the State Examining Board, and the dentists in active practice should have their attention drawn to the action of examinations upon our dental colleges, and upon the dental profession in general. Just as we study the stimulating and depressing action of drugs upon the human system, so we may study the stimulating and depressing effects of examinations upon the pupils, upon their teachers, and even upon those who have passed beyond the school.

My half century of experience with schools, partly as a pupil, and partly as a teacher and state examiner, has thrown into prominence before my eyes certain salient points of inquiry and discussion which, I venture to hope, may be of interest to both teachers and students of dentistry, if not to dentists in general. I must admit, however, that I am not as cock-sure of my conclusions as the dogmatic statements into which I have thrown my thoughts might seem to indicate. To provoke discussion one is tempted to employ forms of statement which can be attacked, and which thus serve to stimulate inquiry in other minds.

The modern examination has almost supplanted the disputations of the me-

dieval universities. Those who wish to teach are no longer expected to show their skill and ability by defending a thesis, but they are asked to show what they know by passing an examination. The apparent ease with which questions may be set as a test of the work accomplished by pupils and their teachers, has led to the introduction of the examination as an educational agency into all our schools. The necessity of facing an examination conducted by someone in authority, say a superintendent or a state examiner, acts as a powerful stimulus upon teachers and pupils, and even upon parents. This is as true of examinations in the college as in the elementary school. The professor whose students fail in large numbers before the state board, feels discredited in the eyes of his colleagues. The student who fails is discredited in the eyes of his parents, as well as of the public, because he cannot enter upon the practice of his profession without incurring the penalty of the law.

Moreover, the examination furnishes an easy way for awarding prizes, scholarships, fellowships, and for filling the positions in hospitals which young men value so highly for the sake of observation and practice. Since examinations almost invariably bring to light the very weakest members of a class, it has become a well-nigh universal custom to test fitness to enter a profession or the civil service by examinations before state boards or special committees. The bungling way in which these examinations are sometimes conducted shows how little thought has been bestowed upon the action of examinations and how necessary it is to study the art of testing the attainments of others. Every art has its mysteries, and to this the art of examining is no exception. In the action of examinations there are mysteries which even the wisest and most experienced can hardly claim to have fathomed. "Any fool," says the proverb, "can ask more questions than ten wise men can answer," and we may add that nowhere can a man show his folly more easily than in the questions which he sets for others to answer. An examiner's questions are apt to reveal his latest fads or hobbies. It is indeed difficult to frame questions that shall be fair to everybody. In view of the difficulties which cluster around examinations, what business has the state to enter upon the task of testing the qualifications of dentists?

State dental examinations belong to the police functions of the government. It is the business of the state to protect the public against harm. The quack is a vampire that lives upon the earnings of the innocent and credulous public. The health and prosperity of a people depend largely upon the teeth with which they masticate their food. An aching tooth inflicts untold misery both upon the individual and upon his associates. A tooth ruined by an incompetent dentist is a lifelong injury to the individual, yea an injury to our Christian civilization. Several dentists whom I can neither forget nor forgive have made me willing to labor without compensation at the thankless tasks of the Dental Council, in the hope that I may help to protect the public against the miseries inflicted by incompetent dentists. Moreover, the honest and efficient dental college needs protection against dishonest and inferior schools which by lowering their standards and providing short cuts to graduation, virtually sell their diplomas to such as will disgrace the profession.

The older professions were law, medicine, and theology. More than twenty other vocations now aspire to be ranked as professions. What constitutes a profession? In the schools we are taught five requisites without which no calling can rise to the plane of a profession. First, it must have a noble aim. Secondly, its operations must not be merely mechanical, but must rest upon a scientific basis. Thirdly, a specific training in special schools must be required of its members. Fourthly, a competent education must be exacted as a preliminary to this special training. Fifthly,

a certain *esprit de corps* must mark the members as a distinct body of intelligent workers in our highly organized civilization. The state examination has helped and is helping to lift dentistry to the rank of a profession. Every profession seeks to protect itself by excluding the incompetent through the agency of examinations. The new profession of dentistry deserves the same encouragement and protection as the civil and ecclesiastic authorities give to the older professions of teaching, preaching, medicine, and the law.

Zeal for the protection of a new profession may cause an examiner to be needlessly severe. A dental examiner should be satisfied with the minimum of theory essential to the successful practice of dentistry. Very rigid examinations defeat the ends for which examining boards were created. They develop the memory at the expense of power and skill. They cause students to neglect operative work by concentrating all their energy upon mere theory. They tempt the student and the professor to devote the available time, not to the mastery of the subject, but to the answering of questions which have been given or are likely to be given at the state examination. The entrance and final examinations at our large universities furnish ludicrous and lamentable instances of the ways in which unwise examinations ruin the methods of teaching and the habits of study. Still more pernicious is the action of severe and unreasonable examinations upon the moral character. To a righteous test no teacher and no pupil should object, but an unrighteous test is an everlasting temptation to cheating and even worse forms of deception. A righteous examination enables a teacher to ascertain wherein he has failed in his instruction. It brings to the consciousness of the learner the points which he has neglected. An unrighteous and unreasonable examination lowers the standard of professional integrity by paving the entrance with fraud and deception. Very rigid examinations may fill the profession with men who are skilled tricksters but poor dentists.

I do not wish to be understood as saying that no legitimate help can be given to a student in fitting him to pass an examination. At the start a few easy questions which everybody can answer set the minds of all to work, and banish embarrassment and terror. A few hints about the best method of getting up examination papers may be helpful in enabling a candidate to show off his knowledge to the best advantage. The daily quiz and periodic written examinations add immensely to the value of the final examination. They help to put the pupil in possession of all his powers, take away the feeling of novelty and unpreparedness for the final struggle, cultivate the power of prolonged effort, the habit of retaining the salient points of every lecture and the still more valuable habit of organizing one's knowledge into scientific unity, thus serving a high intellectual and moral purpose in the educational development of the individual. In this connection, I cannot refrain from quoting the words of one who has given careful study to the action of examinations in English universities. Latham says:

> It should always be recollected that there are two ways in which the miniature struggle in examinations is preparatory to the real encounter in life; it is so not only because it leads men to lay up weapons in the way of acquirements, or to strengthen the sinews of the brain by exercise, but also because it calls out the moral qualities needful for success in life —it requires teachableness, concentration, and, above all, the power of "enduring hardness," of working when one would rather not work, and setting one's self to master thoroughly what may be distasteful. I believe myself that *one great effort* in the way of a heavy examination is a very valuable piece of mental discipline; it calls out the courage and the resources that are in a man; and merely to have made this effort conscientiously, and have done his best, gives a moral elevation to the character, even if he fail in winning any marked success. It gives a man confidence and self-respect through life to have performed something like an achievement—some result of steady self-denial—at the outset of his career.

I have said *one* great effort—of course this one effort will involve many preparatory rehearsals; but these should be all subsidiary to the great struggle; these trials will not affect the unity of the end which the candidate sets before him; in this unity part of the wholesomeness of the effort lies. Singleness of aim is a most important lesson. I am not, be it observed, supposing here that the examination is of any particular kind, or limited to one subject; only it should be such that it may be readily conceived as a whole. If the subjects of examination are very multifarious, the student loses his singleness of purpose; he is always balancing the comparative advantages of investing his time in this branch of study or the other. Hence comes doubt, and doubt often leads to inaction—an inaction by the way which is anything but rest; for though the man does not stir, he is being pulled by conflicting claims in two or three ways at once.

I do not say that two such efforts would do absolute harm; but the second would not bring a like amount of the moral good that we have spoken of; it might, however, have good intellectual results in the way of carrying the student through a fresh range of subjects. More than two such efforts would usually impair the elasticity of the mind, and a series of them would cramp and enfeeble it. A succession of small efforts, such as a series of trials for scholarships or appointments, has a decidedly injurious effect. . . . . There is in them none of the discipline of a grand effort, no gathering up of energies and concentration of them for a single purpose.

This brings us to the limitations and defects of examinations. If the student fails the second time before a state board it destroys his self-reliance and usually enfeebles him for life. When an examination is pushed to the point of fatigue, the memory ceases to work, the understanding goes on a "strike" and the mind loses the power to think and to express thought. Some intellects are aroused by excitement; others can think well only when the emotions are in a quiescent state. The latter seldom do themselves justice at an examination before strangers. But the chief limitation of the examination is on the side of forgotten knowledge. Paradoxical as it may sound, there is value in forgotten knowledge which the examination cannot reveal. A demonstration in mathematics or an experiment in physics may be entirely forgotten, but the principle or truth which was thereby established may abide for guidance during the remainder of a lifetime. Many details of theory drop from the memory of the practitioner, but the substance of the theory passes into his nerves and muscles and unconsciously guides his hand in countless operations. The examination which is fair to the recent graduate may be very unfair to the practitioner of half a dozen years' standing. The recent graduate may be expected to know some things which he can well afford to forget after several years of successful practice. The worst defect of all our state examinations is the impossibility of viewing the practical skill of each and every student when at work upon a patient. Specimens of work are not conclusive evidence of operative skill, and when an examining board has done its best it must still rely to a very large extent upon the honesty of the dean and his co-laborers.

In conclusion permit me to recapitulate the salient points of this discussion.

I. Just as we study the action of drugs upon the human system, so we should study the stimulating and depressing effect of examinations upon the dental colleges and upon the dental profession in general.

II. Examinations have great value: (1) As a spur to pupils and teachers; (2) as a means of selection in awarding prizes, scholarships, fellowships, and hospital positions; (3) as a test of fitness to enter the civil service or the practice of a profession.

III. Examinations for admission to the practice of a profession belong to the police functions of the state.

IV. State dental examinations should have a twofold aim: (1) To protect the innocent public against incompetent dentists; (2) to protect the efficient and honest colleges against the competition of inferior or dishonest institutions.

V. Very rigid examinations defeat the purpose for which state examining boards were created: (1) By developing

the memory at the expense of thought-power and practical skill; (2) by ruining the methods of teaching and the habits of study; (3) by increasing the temptation to cheat and deceive, thus lowering the standard of professional honesty.

VI. Legitimate methods of helping students to pass examinations: (1) By the daily quiz and frequent written examinations; (2) by showing pupils how to get up their answers; (3) by making the candidate feel at ease at the beginning of the examination.

VII. The limitations and defects of examinations: (1) Examinations fail to examine when pushed beyond the point of fatigue; (2) the personal equation cannot be entirely eliminated from examinations; (3) examinations fail to bring out the value of forgotten knowledge; (4) state examinations fail to test the operative skill of the candidates.

Discussion.

Dr. Wilbur F. Litch, Philadelphia. In October 1897 the present dental law of Pennsylvania became operative, hence the system of state board examinations, which was one of the leading features of that enactment, has been subjected to a practical working test for nearly eight years.

Another of the provisions of the act of 1897 was the creation of a Dental Council, a body empowered to supervise the examinations conducted by the State Board of Dental Examiners, such supervision, however, being not technical as to questions, over which the law gives no direct control, but rather executive, or, to quote the act itself, "For the purpose of securing the conduct of examinations in harmony with the provisions of this act." The other chief duties of the Dental Council is to issue to persons qualified under the act, permits to appear before the board for examination, and also to issue to persons qualified under the act a license to practice dentistry in this commonwealth. Dr. Schaeffer's paper has for us, apart from its general excellence, the added interest that it embodies the views of one who (together with his two associates designated by the law, the president of the State Board of Health and Vital Statistics and the president for the time being of the Pennsylvania State Dental Society) assisted in the organization of the first Dental Council of this state, and who was by his associates selected to serve as its president, an office which he continued to fill with conscientious fidelity until last year, when he resigned the position of president to assume that of secretary and treasurer, which being really the active executive office in that body makes it desirable that its duties should be entrusted to one directly connected with the Department of Public Instruction of the state government.

As the president for the time being of the Pennsylvania State Dental Society, it was one of my duties to participate in the organization of the first Dental Council at Harrisburg, and I am glad, from the personal knowledge gained by my association with Dr. Schaeffer in that body, as well as by frequent subsequent interviews and correspondence with him on educational questions, to add my testimony to that of Dr. Broomell in his presidential address to this society this morning, as to the value of the service Dr. Schaeffer has rendered to the dental profession, not only of this state but of the whole country, by the broad-minded liberality and practical common sense he has brought to bear upon the many problems which have arisen in connection with his duties as a member and officer of the Dental Council of the State of Pennsylvania. "The style is the man." What his paper is, a man is—eminently sure, safe, and dependable. I am glad to have been invited to open this discussion, for the reason that it affords me an opportunity thus to testify to the value of his entirely unremunerated services to dentistry, as well as to his professional ability and personal worth. Dr. Kirk, who is also upon the program, was so ac-

tively influential in formulating and securing the enactment of our present dental law, and has studied its practical working with such intelligent interest, that he is far better qualified than myself to discuss many of the features of its provisions covered by Dr. Schaeffer's paper.

Lord Melbourne once said, "I wish I was as cock-sure of anything as Tom Macauley is of everything." It is characteristic of Dr. Schaeffer's modesty and common sense that he disclaims the cock-sure attitude regarding the ideas and principles he has enunciated. Pedagogy, while unquestionably one of the most important of sciences, is at the same time the one which it is the most difficult to reduce to fixed formulas. Broadly speaking, the three essential factors in scholastic training are the student, the subject, and the teacher. The student may be bright or dull, industrious or indolent, receptive or non-receptive—these qualities varying in degree and varying also with the subject taught. The subject may be simple or abstruse—for some students attractive, for others repellant or incomprehensible—while the teacher may be, like the true poet, born to his art, or be made a teacher by circumstances, and perhaps indifferently or badly made.

In the professional school the perplexities of the teacher are still further complicated by the fact that out of ingredients possessing such varying characteristics he is expected to evolve a product qualitatively and quantitively uniform, as determined not only by his own standards of judgment but by those of examiners appointed by the state. While thus commenting upon the difficulties and complexities of the educational problem, I do not cherish the illusion that I can map out a better road to learning than that which, rut-worn though it be, has been followed by generation after generation. Some betterments are of course possible and inevitable, but its chief difficulties are fundamental in human nature and as old as the history of learning. In any educational system worthy the name, there must of necessity be uniformity of standard to which all who would be educated must conform regardless of personal inaptitude or disinclination. As the teacher must have his standards, so must the examiner, and, as Dr. Schaeffer has well said, the art of examination has its mysteries difficult to fathom. To formulate a set of questions for a technical examination which shall make no unreasonable demands upon the examined, and which shall be clear, intelligible, without ambiguity, and beyond the possibility of misunderstanding or misconstruction in any detail is not as easy as might be supposed by those who have not attempted the task. For the teacher also, the art of examination is equally difficult, while at the same time it is perhaps the most important part of his duties. Especially is this true of the oral quiz examination which rightly conducted can be made the means of individualized instruction and of arousing interest and the spirit of inquiry, impossible when the student body is examined *en masse*. Indeed, rightly conducted, all education is an answer or an attempted answer to an interrogation expressed or implied. When the true interrogative note can be awakened in the student's mind the educational battle is half won. Not until the student begins to question does he begin to really learn. The great and apparently insuperable difficulty of our present system of teaching is that highly individualized instruction of any kind for the student is, under existing conditions, impossible. For commercial reasons the student body must be dealt with largely in bulk. A dental school today must have a large number of students or it cannot exist, and unless richly endowed or without a great increase in fees, no school can afford to make its corps of instructors correspondingly large.

An analogous difficulty also exists as regards the examining boards; unless endowed or adequately salaried by the state they cannot afford the time requisite to carefully and personally test each can-

didate, not only by oral and written examinations in theory, but by obtaining from him a personal demonstration of technical proficiency in all branches of dental practice. As Dr. Schaeffer has justly remarked, the specimens of completed work submitted by the college graduate are not the conclusive evidences of operative skill which should be submitted to examining boards. It is thoroughly illogical that while under the law the dental examiner is not permitted to accept the attestations of a college faculty as to the proficiency of a student either in theory or practice of dentistry, the law permits him to accept the attestation of the clinical instructor that the specimens of work, operative or prosthetic, presented by a student were actually the product of his own unaided effort.

Inadequate and inconclusive as the system is from the standpoint of the examiner, it is difficult to see how in a great educational center such as Philadelphia it can be materially improved. In states where there are relatively few applicants for licenses more adequate tests in practical office work can be and often are insisted upon, but in no state are those tests sufficiently extended in character to constitute evidence which can be regarded as fully satisfying.

And so we have in Pennsylvania the anomalous result that in order to secure a license to practice the graduate must submit to a rigid examination in theoretical subjects, ignorance or forgetfulness of which would in many cases but little affect his ability and usefulness as a practitioner, while all that is demanded as evidence of that technical skill which is so vital to professional usefulness is the presentation of completed work giving superficial evidence of a greater or less degree of mechanical excellence, and for his knowledge of theory he gets full marks while for practical work he gets no marks whatever.

Dr. Schaeffer has stated that, like the woman mentioned in the Bible who had suffered many things of many physicians, he has suffered many things of some dentists whom he can neither forget nor forgive, and I am sure that he agrees with me in thinking that if the real purpose of the dental law is to protect the public against the incompetency from which he has suffered, that object can best be gained, not by laying less stress on theory, but by attaching more importance to practice and giving demonstrated skill in practice at least an equal showing with that ability to memorize and repeat names and formulas which is the chief basis of success in examinations as now conducted.

This is a matter which appeals to me as a teacher, because every year there come into our classes young men, very worthy but of limited mental power, who do not readily memorize the polysyllabic nomenclature of medical and dental sciences, and who have limited capacity for recondite thought. While not brilliant students, they are often and of necessity more painstaking and industrious than many of their associates who outclass them in examinations. Such students, notwithstanding their limitations, often possess certain other mental endowments —a saving common sense, and perhaps high mechanical ability which in after life will carry them well to the front as useful and successful practitioners of dentistry. The universally recognized fact that it is not always or usually the high-honor man of a class who achieves the greatest success in life in any calling, I have, during my nearly thirty years experience as a teacher, seen many many times illustrated in the field of dentistry.

While during three years of intercourse a teacher has full opportunity to recognize and allow for the weak as well as the strong points in the mental make-up of such students, and can judge them by many tests, oral and written, as well as by the personal observations of their technical skill as operators, the state examiner is compelled to judge them almost solely by one test—the written examination, in which they are weakest —and as papers must be accepted on

their face value, the applicant for license comes to grief. I do not by any means wish to be understood as claiming that all those who fail before state boards are of the character I have described; far from it. A majority of them are weak all round, and just manage to pass in school, and unless luck particularly favors them, generally manage not to pass before the state boards. It may be claimed that such men should not be allowed to graduate. It must, however, be remembered that there must be a minimum standard, which if reached entitles the student to graduation. The faculty has no right to reject a man simply because the probabilities are that he will fail before a state board. The reasons why he may be able to obtain in college a passing mark of seventy-five and fail to reach the same mark in a state board examination are numerous and not far to seek. In a college examination the student's chances are much favored by the fact that he has had three years in which to become familiar with his teacher's fads, theories, line of thought, and general point of view. Undoubtedly, too, the teacher usually marks more leniently than does the examiner. It often happens that an answer, without being grossly inaccurate, is careless in expression or defective in details regarding which the teacher knows to an absolute certainty that the student is sufficiently informed, and for that reason will give the answer a rating to which it is intrinsically not entitled. The examiner, on the contrary, having no sources of information other than the examination paper itself, cannot go behind the returns. Then, of course, while among his classmates and chums, there are better chances for the student to obtain surreptitious help. Students, the best of them, even if they do not need to copy from others, will take no active measures to prevent others from copying from themselves, and with all watchfulness and every precaution it is difficult if not impossible to entirely prevent the practice. Before this intelligent and well-informed, not to say experienced, audience it is not necessary to dwell further on this point. The conditions under which the state board examinations are now held in Philadelphia, with a large hall for the examining room, wide spaces between the desks, and an entire obliteration of class lines, have so increased the difficulties of copying as well as other forms of cribbing, that they are now practically eliminated.

Another consideration to be taken into account is that in the state board examinations so much ground is to be covered, and so much is at stake that the weak man is not at his best. He becomes nervous, excited, and often goes to pieces, failing to answer correctly simple questions concerning which he is far from ignorant. The chief reason, however, for the failure of college graduates in state board examinations is that in college the courses are graded and divided, each year of the course being final as to certain subjects. In state board examinations all the subjects of the collegiate course must be passed in three or four consecutive days. It is perfectly obvious that for the weak student, or for any student, it is far easier to pass within a given time an examination upon two or three subjects than upon the ten subjects required by the dental law of Pennsylvania. The system of divided examinations now operative in the state of New York, by virtue of which medical students are permitted to appear before the state board and take examinations in certain subjects at the close of the second or third year of four-year courses, has resulted in largely reducing failures. Mr. James Russell Parsons, Jr., director of the College Department of the University of the State of New York, makes the statement that "Before the state board in the case of candidates taking the full examinations 20.8 per cent. were rejected in September and 29.7 per cent. in January, while of candidates taking the divided examinations the rejections were only 5.5 per cent. in September and 2.2 per cent. in January."

I much regret that the revised law reg-

ulating the practice of medicine which passed the last Pennsylvania legislature was vetoed by the governor, as it contained a provision for divided examinations for medical students in this state, which I feel confident would have led ultimately to the incorporation of a similar provision in our dental law. Such a provision, I am sure, would be in the interests of sound dental education. A system of divided examinations by state boards in harmony with the graded college course not only enables the student to accomplish a given task with less labor, but with better results by giving him all the advantages to be gained by consecutive concentration of study upon a limited range of subjects. Furthermore, if such basal subjects as anatomy, physiology, histology, chemistry, and metallurgy can be finally disposed of at the end of the second year, the student can devote the time he now expends in "boning up" on those subjects during his third-year course to the remaining studies of the curriculum and to practical operative work in the clinics, often now neglected because of the many hours necessarily devoted to "cram." Another good effect of the divided state board examinations is that it serves as a wholesome check not only to indolence but to bumptiousness and self-sufficiency. If a student richly endowed with these characteristics fail before a state board at the end of his second year it is safe to say that by reason of that lesson he will be not only an humble, but a more industrious and faithful student for the remaining year of the college course.

It may be claimed that the system of divided examinations pampers the student and emasculates his powers, but if that is the case he comes to us pampered and emasculated, for in all departments of preliminary education the general rule is to examine the student when his work on a given subject is completed. Indeed, so far is the trend in that direction, that in many schools the final examination for promotion is no longer required of those who obtain a certain average in class work during the term. Many instructors are of the opinion that this system presents so great an inducement for industry during each and every term that the general result is better than under the old method which required a grand "cram" towards the close of the final term—the "one great effort" upon which Latham, whom Dr. Schaeffer has quoted, lays so much stress. The chief purpose of general education is undoubtedly character-building, and the "one great effort" may or may not be best adapted to secure that end. The chief purpose of professional education is technical proficiency, and the methods which will best promote that end should be the methods of the teacher's choice.

For some reasons and under certain circumstances it would be advantageous to have the written examination supplemented or replaced by an oral examination. The dental law recently enacted in Illinois makes it optional with the state board whether the examinations shall be written or oral, but it is evident that such a dual system opens the door for abuses and makes possible charges of favoritism, for which there can be no reasonable grounds under our own state law, which requires that every question asked and its answer shall go on record and for a term of years be kept open for inspection in the archives of the state.

One of the most admirable features of the Pennsylvania system is that an examination is not a star-chamber proceeding. I have but small tolerance for secrecy and exclusiveness regarding state board questions after they have served their purposes in a given examination. To me such secrecy seems illiberal, uncalled-for, and unscientific. Any question that is fit to ask is fit to print, and for its educational value ought to be made public. For any question not fit to ask, publicity is demanded in order that its unfitness being exposed it may be put out of commission and made incapable of further harm. A fool question in an examination is, in its way, quite as dangerous as the gun which the fool owner

does not know is loaded; either, although in quite different ways, may put an end to a career. In Pennsylvania, college faculties are not kept in the dark as to the exact character and scope of the examinations their graduates fail to pass, hence if questions are regarded as faulty by a teacher there is full opportunity for an exchange of views with the examiner by whom it was propounded, often to the advantage of both. Good questions are not infrequently helpful to the teacher by opening up a new point of view regarding the subject to which it relates.

While I think that there might be betterments in detail, some of which I have indicated, I am in thorough accord with Dr. Schaeffer's position regarding the necessity and value of state board examinations for dental and medical graduates. As he has justly remarked, the system is not only a needed protection to the citizen, but it is a stimulus to both teacher and student, and thus advances the schools while it conserves the interests of the state.

Dr. R. H. Nones, Philadelphia. I think we are all willing to admit that this seeming necessary evil, the examining board, has come to stay, and while we may not all be of the same opinion concerning it, there is no doubt that after proper modification much good may result to the colleges, the profession, and the public in general; but as at present constituted, the cart is before the horse. State dental examinations may belong to the police function of the government, but what are the rights and privileges of an institution to which a charter has been granted by the state? It does not seem logical that a half-dozen men should pass upon the qualifications of students to practice in the particular state in which they were graduated by a chartered institution. I have always felt that if boards are to exist, the members should first qualify themselves. How many members of boards would care to be placed on the witness stand as experts in the particular branch on which they examine? How many would feel competent to give a course of lectures on the branch in the colleges of which they are finally to pass judgment upon the graduates? How many are trained in the art of asking questions in order to find out what the student knows, not what he does not know? This is a part of one side of the question.

I would not have my listeners think for one moment that I am not in favor of state boards, particularly at this stage when we must accept them; that they have not done noble work, and that they cannot do still better work; or that anything but the most pleasant relations exist and have always existed between our institution and the boards and myself personally. I have always found the members of all boards, and particularly the Pennsylvania Board, more than one could expect under present conditions, and have lent at all times all possible aid to the advancement of the colleges and profession.

As the essayist has said, "They have been a spur to colleges, teachers, and students," but preparations for board examinations can be kept too prominently before the student, and by so doing his thorough education may be neglected. I have from the beginning felt that too close a relationship could not exist between the boards and the colleges. If they are to pass finally on the product, why should they not watch the growth and have a hand in the making of the product? passing on its fitness to commence and advancing it from year to year. Let them be so qualified and associated with both college and student that errors may be met and corrected before the student shall have received a diploma giving him all the rights and privileges, and perhaps have these privileges taken from him as the result of answers to ten questions on the different subjects propounded by half a dozen men, who, I do not doubt, themselves would prefer a closer connection with the colleges that they might have a better knowledge of the qualifications of the

applicants upon whom they are to pass final judgment. This in itself is not fair to the boards.

I fully appreciate the impracticability of these ideas, yet they are not impossible. I believe the time may come when the colleges will do the teaching and the boards the examining, advancing or terminating the progress of the student from year to year. I do not believe that any college in the United States graduates students not competent to at least begin the practice of dentistry, but as the examinations are now conducted, almost entirely theoretically, the protection which the public should have is not given, as many, very many questions might be properly answered by one incompetent to practically take care of the mouth, while the reverse might easily be said of many well able to save the teeth.

An argument in favor of yearly examinations by the boards is that the subjects are fresh in the minds, and also in passing them off they are relieved of time that might well be devoted to practical work. An argument against this is, if they cannot remember for a year or two, they should not be allowed to graduate. Many minds are not retentive, and if a law were passed compelling practitioners to qualify by an examination each year, how many of our practitioners who have served the public long and faithfully would have their licenses renewed? Or how many teachers or members of the state boards would meet the requirements? Too much stress cannot be laid upon the essayist's words, "forgotten knowledge." The essayist's thought, as I take it, is, among other things, to conduct examinations so that thought and skill may not be sacrificed for the benefit of memory training; that temptation to deceive and cheat may be eliminated. And I think this could probably be brought about by the examiner understanding the art of examining. .

One of the most valuable points in the paper is the neglect of the state examinations to bring out the operative skill of the candidate, and this will continue to be so as long as the colleges and examiners are so widely separated as at present. I have argued from the beginning and tried to have the board accept the suggestion that the practical work should receive an average and marking the same as the written, which it does not in this state.

The desire should be to accomplish the greatest good for the greatest number, and this can only be brought about by a better understanding and a closer relationship of the boards to the colleges.

Dr. E. C. Kirk, Philadelphia. I have been interested in dental legislation in this state from the inception of the movement which lead to our present dental law. I had something to do with the committee work that produced and passed our present dental act, and I believe, after a very careful study of the question, that the Attorney-General of this state was entirely within the limits of accuracy when he said publicly regarding the statute of 1897, that "Pennsylvania has upon its statute books the best dental act of any of the states of the United States." This act contains a provision which makes examinations by the State Board a matter of public record. If you come to think about the operation of that provision, you will see that every time the board of this state conducts an examination, it, in a certain sense, places itself under examination by the public. In other words, the whole profession is cognizant of the character of questions, the mode of conduct of the examination, the markings of the papers, the examination results, and everything thereto pertaining. This is a feature in the law which characterizes it as different from the majority of statutes of the other states, in that our law has taken cognizance of the fact that the dental student has some rights which the state is bound to respect and makes provision for the care of those rights. Its operation is equitable. I suppose when I give this personal experience I am duplicating the experience that every dean of a dental college in this state may have had.

I have frequently had students complain to me of unfair treatment at the State Board examinations; in one specific instance a student came to me and said that he knew he had answered all of the questions in a certain branch and that he had only received a mark of fifty in that subject. I asked him if he was willing that I find out what the real facts in the case were. He said, "Certainly; I am quite sure that I answered all of the questions." I sent to Harrisburg for a transcript of the records in his case—that is, the questions, answers, and markings. I found that he had answered every question, but answered five correctly and five incorrectly, and had received a mark of fifty. The result of the inquiry satisfied him. I simply mention that incident to testify to the correctness of Dr. Litch's statement that in Pennsylvania we do not have any star-chamber proceedings in the matter of licensing candidates.

The essayist called attention to a very important point with regard to the working of the examinations, suggesting an analogy between the effect of the examination upon the student as being similar to the effect of certain drugs upon the human system. An examination, as he says, may be too rigid, but I wish he had gone a little more into particulars as to what he meant by rigidity of examinations. It is true that for the student the examination is a stimulus, and if made too difficult, which is one of those indefinable things, it over-stimulates and produces paralysis. Just as a small dose of strychnia has a stimulating effect, and an overdose will produce complete, permanent paralysis or death. But the question of rigidity in examination or difficulty of examination, it seems to me, is a relative term. No examination is too difficult for the man who knows his subject, and the question which he has raised that the nervousness of the candidate causes him to get flustered or rattled—that is the term the student uses—seems to me to have its deep origin in incompetency. Why does the student get rattled? Why nervous? I guarantee that if I immediately summoned this audience to a written examination conducted here by the State Superintendent of Public Instruction, and should set the question on the multiplication table or the alphabet, everybody in the room would pass both examinations with an average of one hundred per cent. and certainly no one present would be rattled. We are all familiar with the multiplication table and all are familiar with the alphabet; we all know very well how to repeat them forward and backward and everybody would pass the examination. Why? Because we know the subject. It is then a question simply of how much a man knows of a set of questions whether he gets nervous, or whether the examination is difficult, or whether he gets excited or rattled, or any of these things. I admit the factor of fault upon the part of examiners. I suppose it is a feature to some extent of the examinations of both the colleges and the examining boards. We have seen examples in the type of man Dr. Schaeffer referred to as the faddist—the man of one idea, who presses with too much emphasis upon one note in the educational symphony. But the principal fault is on the other side of the question, namely, the faulty student, and it is the function of the examination to eliminate him. The colleges are taking today every man who measures up to the qualification required by the entrance standard. There is no further question as to his admission. We fix a standard of admission and we take anything that measures up to that standard. Then, as has been alluded to very definitely here, examinations are based upon a standard which is a minimum standard. We say this is the lowest standard or least educational attainment upon which we will admit a student to the course and grant a degree—or, in the case of the state board, grant a license. Now, there are numbers of men who by virtue of superior memory or by a happy set of circumstances have gotten a set of questions in the examination of which they know

just enough to obtain a certain percentage which enables them to pass the examination. They may, however, go before a state board with another set of questions and be entirely incompetent to pass, and these men are thrown out. When this happens there is a raising of the eyebrows and questioning as to why such men failed to pass. We must expect that; it is a weeding-out process of the weaklings. It is no disgrace for any college to lose occasionally a student before the state board examination. It simply shows what I have already stated —it proves the efficiency of the system of weeding out the incompetent—those who have by accident and not by merit passed the college examinations.

I should like to see more harmony in regard to this question of the relationship of the state boards to the dental colleges. One of the gentlemen who preceded me referred somewhat feelingly to the old story that by the present law of Pennsylvania the licensing function is taken away from the colleges, and rather questions the right of the state to take away from a chartered institution that right originally embodied in the charter —the right to license graduates. There are two sides to that question. Let us take a parallel outside of dentistry. The man who is a student of science—the man who is making a specialty, for example, of bacteriological research, or devoting his life and time to the study of chemistry, and who is investigating chemical questions along new lines—always conducts what he calls a control test. He runs his analyses in parallels. He is not satisfied that one analysis is correct. He recognizes in himself that source of error which he calls the personal equation, and, if he is a scientific man, he welcomes any method by which he can eliminate from his own observations the source of error involved in the personal equation. Adapting the same thought to our educational methods, it seems to me we should welcome the control test given by the state board. The state board is not an educational body. Education is not their business. They are overseers; their business is to find out whether the institutions in graduating their output have produced the proper grade of product, and if the boards can find weaknesses or errors now and then, let them do so, for I hold that it is the business of the institutions to so educate men that they will be quite able to pass the state board test. When the institutions cannot do that, there is something wrong and something needing to be corrected. I believe the operation of the state law and the activities of its state board should be regarded by the institutions as the control test of their product, and should be welcomed by the colleges in that spirit, and we should be glad indeed to have the approval which the state in its examinations stamps on the product of the colleges, as a proof that the work we have done in an educational way has been correctly done.

There is one other thought that I wish to bring out somewhat more fully. That is, the question of the rigidity of examinations and the temptation which that factor offers to the student to cheat. It is a complex problem, as Dr. Schaeffer has said, but anyone who has had to do with the teaching of human minds anywhere from the kindergarten to the university will recognize two general classes of students; those who memorize and have been memorizing from the beginning, and the other class who think. And the more I have in a practical way investigated the class of men who memorize, the more I regard the memory-training process or the memory-cramming process as not only worthless as intellectual culture, but really worse than worthless—it is intellectual prostitution. I have made a study of the cheating class of men as a species, and in nearly every instance they have turned out to be a class of men who do not think. I was deeply puzzled over this question at one time, and I said to my colleague, Dr. Darby, "The trouble with these men is that they answer questions like parrots." and he looked very wise and thoughtful

for a moment and then said, "Yes, that is exactly what it is. The parrot can talk but he cannot parse." Now these men should not be taught nor should they try to learn the subjects—chemistry, anatomy, operative dentistry, etc.—so as to be able to repeat answers upon them; but they should be taught to reason concerning them, so that they can "parse" them, as it were. It is a question of developing by the course of instruction the faculty of intelligent rational thinking.

I want to make here a criticism concerning the character of the product that comes to us from the public schools and which is delivered to the doors of the colleges, out of which material we are expected to make dentists. I ask that the educational authorities give more attention to the necessity of stopping this memory-cramming process in the preparatory schools and concentrate their efforts upon the development of the habit of systematic, logical reasoning and thinking, so that pupils will have formed a rational method of study at the time they are delivered to us as material out of which we are to make professional men. I think that is the essence of the question regarding the relative difficulty or rigidity of the examinations. Men must learn to think. This fault is evident throughout the whole educational system, and of course involves the question of the competency of the teacher—but that is another story.

Dr. S. H. Guilford, Philadelphia. The state of Pennsylvania in its law requires that anyone desiring to enter upon the study of dentistry shall have a preliminary education equivalent to that which he would have received if he had studied for two years in the high schools of this state. Why has that provision been made? Why do we establish such a standard? It is because the public schools of the state are non-sectarian, non-political and are conducted by able and conscientious teachers and superintendents. I do not believe that Dr. Schaeffer would for one moment retain the position that he now holds if he, as superintendent, did not feel that the schools of this state are equal to those of any other state. And if they were not as good as he felt they should be, I believe he would use his utmost endeavors to improve them. Now, let us see how the matter of preliminary education works. The student applies for entrance to one of the dental colleges, and is required to present credentials of preliminary study. If he can show that he has passed through the grammar school and after spending two years in the high school succeeded in passing the regular examinations, he can be received without question. That is to say, because of the high standing and the character of these public schools and the thoroughness of instructions and examinations conducted therein, the students are accepted without further question. If the student does not present satisfactory credentials he is obliged to pass an examination supposed to be equivalent to a two years' high-school course. Among the students who come to college nowadays a large proportion have the required certificates showing that they have passed through the public schools up to at least the close of the second year of the high school, and yet with all that, notwithstanding the high character of the schools, the high character of instruction, and the high character of the examiners and state superintendents, it is a lamentable fact that many of these men violate all the principles of grammar, rhetoric, and orthography in their examinations. Why is this? It is due to a defect somewhere. I have often been astonished to find men come to college and enter upon their work, stand high in the school, and then in the final examinations their papers would be full of bad spelling, bad sentences, etc. So even with all these safeguards we do not always get what we want. Still, I believe we are getting the best product we can as the result of the education in the state public schools. This matter of preliminary education is an important one, because, as the essayist has remarked, unless the man is given the proper preliminary training for the

profession he is about to enter, it is altogether probable that he will not be able to assimilate the instruction given him by the professors. At the same time, however, we know that this preliminary education has its limitations. In other words, it may be carried too far. Occasionally, and I wish it were oftener, men enter our schools as students who have not only taken the course in the high school but who have a college education, and possibly one or two titles to their names. These men come well prepared from the mental point of view. They start upon the study of dentistry, and the lectures are easily apprehended. They are able to accept, absorb, and assimilate them, and pass good examinations, and yet on the other hand in many cases these men are inferior in manual dexterity, the one thing upon which we lay so much stress in dentistry. Now dentistry is an art and a science; we must not forget that. It is not wholly an art or a science, it is a combination of the two, and we must not neglect the one to the advantage of the other. Take another class: There are frequently men who have pursued the medical course, received the M.D. degree, and afterward decided that they probably will have a better opportunity in the practice of dentistry. They enter a dental college and pursue the course required there, and what is the result? These men are usually admirably prepared for examinations, have a good knowledge of the subjects taught, and yet for some reason or other the majority of them are inferior in manipulative ability —the finger skill which they should have. Why do these two classes fail in that respect when their previous education has been advanced to such a high degree? It is for the reason that during the years of their life in which the hands are best fitted to learn to do the things required in dentistry, these have been neglected. They have passed beyond that period by having their preliminary education carried so far, consequently they are not able to acquire the fine technical skill which is so essential to the successful practice of dentistry.

In regard to other examinations Dr. Schaeffer does not concern himself, but he is necessarily greatly interested in those held at the close of the college career, before the student is allowed to practice. To many minds it may seem incongruous that a man should be required to take a second examination before he is allowed to practice. Whether or not these state examinations have proved a benefit to the student and the profession, they certainly have been of benefit to the community at large. A strict examination never worries a student if he is well prepared. There is no reason why a student should fail before the state board if he has passed a good examination at college. Men who fail in college examinations are composed of two classes: either they have been negligent while students, or else they are inferior in mental capacity. We have both kinds. Those who are negligent deserve to fail. Those who are inferior in mental capacity should be advised to leave and pursue some other vocation. So, as a general rule, those who have been properly prepared are the ones who pass the college examinations and the state board examinations as well. In regard to college examinations, it is remarkable how a teacher can often pick out the men who probably will fail in the final examinations; not invariably, but as a general rule. It is also singular to notice how nearly accurate one's judgment becomes in these matters. I have noticed that those students who fail in the college final examinations are usually the ones who fail before the state boards. Occasionally, however, we are deceived, for a man sometimes passes the college examination and fails before the board. At other times one will just barely get through the college and yet pass a fine examination before the board; but as a rule, however, the men who come near failing in the college finals are the men who fail before the board.

In this state we have been singularly fortunate in having a state board that has been composed of men not only capable, but honest and most faithful to their trust. Some other states have not been so fortunate. In some states men are appointed by political power, and as a result candidates have been passed who should not have been. There is one unfortunate thing about our Pennsylvania state law which has been mentioned by the other speakers, and that is that it does not allow any credit to be given for practical work. Dr. Schaeffer, although not a dentist, emphasizes the fact that practical work should come first, because that is what the state tries to secure for the benefit of the people, and therefore instead of allowing for the student's practical work only when he gets close to the required mark, I think his prosthetic work should be fully considered in his rating. Practice should really come first and theory afterward.

There is one other matter, interstate reciprocity in dental licenses, that most of all of us would like to see brought about. Until that golden day arrives when a dentist who has been in reputable practice in one state will be permitted to go into another state and practice without further requirements, I wish I could have two kinds of examinations, one such as is conducted now for the new graduate, and the other for the men who have been in practice for many years. At every examination held by the Pennsylvania State Board there are men who come before it from other states desiring to practice in this state, and who have been in reputable practice for many years. Their knowledge of college studies has become dim, and they cannot be expected to pass the same examination as the new graduate, and yet these men are given the same examination. If I had my way, I would, in examining these men, allow their examinations to be based on one-fourth theory and three-fourths practice. I think that would be a fair basis, because not only are these men qualified to practice but such an examination would both fulfill the law's demands and assure the protection of the state's interests.

Dr. Jesse C. Green, West Chester. It seems to be the proper time to add a few words that might be interesting as coming from one who has been on the examining board for a number of years. Before saying what I especially arose to speak about, I would like to suggest something with regard to examinations. Having had some experience in the examination of teachers for places in the public schools, I fully agree with Dr. Schaeffer that the proper thing is for the examiner and the one to be examined to place themselves in the relation of scholar to teacher. I have found it very good to say to the candidate, as though I were the pupil and he the teacher, "Now, I want to ask you a few questions," and I have found that this so takes away the feeling of fear from the applicant that good answers are obtained. That is my conviction with regard to examinations, and while on the examining board (which was from 1876 to 1898) my position was that the best results from our examinations are to be obtained by placing ourselves in the position of pupils and the candidates in that of teachers.

Speaking of successful answers, I know men who could perhaps answer every question and yet, as Dr. Guilford says, they are not practical men. I know a dentist who stood very high as a public orator, who could tell all about how to do it, but was not a successful practitioner himself because he had no skilled fingers. It is very important to have fingers. A dentist in my town said that he had very good ideas but very poor hands. That this is only too true of many others has been my impression within the last twenty years. It seems to me that the experience of some of the men who have been on the Pennsylvania State Board would be valuable in this connection.

Dr. J. A. Libbey, Pittsburg. The impression has been made by everyone discussing the paper that the examiners did not give proper credit along one line.

and that was with regard to the practical examinations. There was scarcely a year during my experience on the board that there was not someone rejected on account of being unable to show satisfactory practical work. The law, after stating the different subjects upon which applicants are to be examined, states specifically that there must be satisfactory practical work shown. One year particularly I remember when a man was rejected because he did not show satisfactory practical work, who afterwards with continual practice and work finally succeeded in passing on his practical work in the course of two years. This man's written examination was above ninety, yet he was held back for two years on account of not being able to show satisfactory practical work. Now that has been the case nearly every year while I was on the board—someone was rejected on account of his deficiency in practical work. So you can see that the board has given more attention to the matter of practical work than it has been given credit for, or that the gentlemen who have discussed the paper would lead the members of the society to believe. I am willing to admit that I would be glad to see some more thorough method of examination on practical work. I think it would be well if every member of the board could see every student doing work in the different lines of practical work required. I think they would then be in a better position to decide that point.

The paper was so thorough and so practical that there is no chance from my standpoint to criticize it, and so there is little that can be added to it along that line. I hope some time in the near future we will have a repetition from Dr. Schaeffer. The only thought that I wished to impress was that the board did take into account the practical work.

There is another thing. During the college course of three years the teacher becomes thoroughly familiar with the students, and they can take up their papers and examine them and go through every paper in a short time and mark them. I am satisfied that the teacher in school will mark three or four papers while a member of the State Board examiners is marking one. My experience on the board is that every man is given credit for everything that is earned in the paper, and the papers are very frequently gone over a number of times. I have noticed time and again that an examiner would go over a paper, giving a certain mark, and in going over it the second time he would run across one or two questions and find in them some of what Dr. Schaeffer called forgotten knowledge which would show that in answering a certain question he knew more than he had indicated in the former one, and in every instance he would be given credit for this. And that is the method by which the State Board examines papers, and their work is thorough. If any man wants to get a good training, let him get appointed on the board and have every teacher and everyone connected with the schools watching his questions, and have his questions published, placed on record, and sent out broadcast. If that is not a good training to make a man thorough in the work, I don't know what is, and that, gentlemen, is why the Pennsylvania State Board gets such good results.

Dr. C. V. Kratzer, Reading. I merely rise to indorse what Dr. Libbey has said of the practical work of the men who come before the State Board for examination. I want to say in addition that in more than one instance, during my experience on the board, was the good showing of the manipulative work of the student used to offset a rather weak theoretical examination. I recognize, as do all the men who have served on the board, the weak points in the methods of conducting the examinations of the State Board as at present constituted. I recognize that the opportunity to examine the practical work of the applicants who come before the board for examination is very imperfect, and I trust that some day it will be improved. As Dr. Schaeffer says, the only proper way is

to see the men perform the work themselves—to see work actually performed on the teeth. The methods of manipulation should enter into the requirements for practice. I would say furthermore that three days, as pointed out by Dr. Schaeffer, is crowding the examinations too much. I believe that if the student were given only one day in each week for three weeks, he would make a better showing. I believe it would be far better, for a closer relation could be established between the examiner and the graduate. He would then be able to learn some of the idiosyncrasies or characteristics of the individual men he examines, which, as the examinations are at present conducted, it is impossible to do. Unfortunately this seems impractical at present, and the Examining Board must be content to do the best it can.

Dr. Otto E. Inglis, Philadelphia. In connection with the State Board matter, it might bring the colleges and boards closer together if they could agree upon a certain series of questions to be asked the student. The trouble with the student is that when he anticipates going before the board, the question in his mind is "What am I going to be asked?"

It is often the case that after a man passes the college examinations, he will take a book on "questions and answers" and study especially for the state boards, and in one instance a man told me that he had picked out nine of the ten questions that he got from the board examiner on a certain subject. I do not wish to intimate that great numbers of students pass the examination simply from the information gotten out of a book on state board questions, but they get help from it.

The point I wish to make is this, let the examiners and colleges agree to select four or five or six hundred questions aimed to cover a subject thoroughly and to constitute a list from which state board questions may be taken. The students will know that the questions will be selected from this list, and they will be benefited by their study. By this means some sort of unification may be arrived at.

Dr. H. B. McFadden, Philadelphia. I think the scheme Dr. Inglis suggests is going back to the subject of educating parrots. The men might be able to answer all the questions and still not know the subject.

(To be continued.)

MASSACHUSETTS DENTAL SOCIETY.

Forty-first Annual Meeting.

The forty-first annual meeting of the Massachusetts Dental Society was held in the Massachusetts Charitable Mechanic Association Building, Huntington avenue, Boston, Wednesday, Thursday, and Friday, June 7, 8, and 9, 1905.

First Day—*Evening Session.*

The meeting was called to order at 7 o'clock Wednesday evening by the president, Dr. E. O. Kinsman, Cambridge.

The first order of business was the reading of the records of the last meeting by the secretary, Dr. C. W. Rodgers, Boston. The records were approved as read.

The new constitution and by-laws were then adopted.

The next order of business was the reading of the President's address. The president, Dr. E. O. Kinsman, having called Dr. J. W. Ball, Boston, to the chair, then read his address, as follows:

The Massachusetts Dental Society: Past—Present—Future.

In 1883, at the nineteenth annual meeting of this society, Dr. John T. Codman of Boston, now an honored ex-president of the society, read a paper entitled "Early History of the Massachusetts Dental Society." We have taken the liberty after twenty-two years have passed to cull from it a few facts to enlighten the younger members of the profession, and also refresh the memory of the older ones present who may be willing to listen to a review of the society—what it was, how it started, how it lived and grew. Then we will take up the thread of life where he left off, and, after reviewing the main facts to the present time, impart to you our hopes for its future.

This society was formed March 4, 1864. In February 1864, two dentists accidentally met in the S. S. White depot, and while conversing on the subject of the want of union and brotherly feeling among dentists, one of them asked, "Will you be one of six to form a dental society?" The other, after assenting, called on Drs. Chandler, Ham, Harriman, W. W. Pray, E. N. Harris, and others to the number of twelve. The two dentists were Drs. D. G. Harrington and S. J. MacDougall of Boston. The first meeting, held in the old Tremont Temple Building, opposite the Tremont House, was organized by choosing Dr. Ira A. Salmon chairman and Dr. S. J. MacDougall secretary. A committee was appointed to draft a constitution. Four or five meetings were held, new members were admitted, and plans talked over in preparation for the first annual meeting, which was held in Boston May 6, 1864. At this time such men as Drs. Elisha Tucker, John T. Codman, Isaac J. Wetherbee, H. F. Bishop, A. Papineau, and others had united themselves with the first named. At this meeting to fully complete the organization the following board of officers was elected:

President—Nathan C. Keep.
Vice-President—Isaac J. Wetherbee.
Recording Secretary—Thomas H. Chandler.
Corresponding Secretary—E. C. Rolfe.
Treasurer—S. J. MacDougall.
Librarian—E. N. Harris.
Executive Committee—I. A Salmon, S. A. Cook, B. S. Codman, H. F. Bishop, T. B. Hitchcock.

Two of the original Executive Committee are still living, H. F. Bishop and S. J. MacDougall, the latter being an honorary member.

Up to April 1, 1865, the society was known as the Massachusetts Dental Association. It was incorporated at that time and the word "Society" substituted for "Association."

Dr. Keep delivered the first annual address. In 1865 the first social gathering and dinner was held at the Tremont House. Each member paid a dollar and a half for his dinner. The first written essay (aside from the annual address) was by Dr. Isaac J. Wetherbee, on "Mallet Plugging." In 1866 the American Dental Association had voted to meet in Boston, and this society raised at its meeting $250 to entertain the members of the association; the full amount raised was $1160.30—a really liberal amount. At the end of the third year or thereabouts the society adopted the code of ethics as used by the American Dental Association. In April 1867, Dr. Wm. H. Atkinson of New York city read a paper on "Histology," and a collection for his benefit was taken up. It amounted to $18.

At the fourth annual meeting a few clinics were given; $175 was appropriated for the purchase of a microscope. The society was holding monthly meetings and continued so to do for several years, selecting a year's supply of essayists in advance—one for each month. An endeavor at this time was made to establish a dental journal but fell through after a hard struggle.

For some time the society flourished. Out of chaos a great deal of order came. The society made a place for itself in the profession and in popular esteem. Then a spirit of rivalry sprang up and divided the society. Various changes in the number and quality of the meetings occurred.

In March 1873 the semi-annual meeting was held in Worcester. Seventeen members were added to the society, a better feeling prevailed, and the seed planted bore good fruit. At the twelfth annual meeting Dr. John T. Codman was elected president. A strong endeavor was made to bring up the character of the meetings to the former standard of excellence. At the thirteenth annual meeting the society numbered 58 members, and at the following two meetings 39 more were added. Of these several were former members returning to the fold.

At this point Dr. Codman closed his review, saying, in substance, "When a society's members and officers attend to the legitimate duties of a society devoted to dental science and to the education of its members socially and professionally, it prospers; but when the officers stand on close ethics and hold a tight rein over the private judgment of the duties of members toward the profession, or when members have private axes to grind, the society loses strength, its members give it the cold shoulder, and its usefulness wanes."

The society has been of much use to the members of the dental profession in Massachusetts, and its influence has extended far beyond the borders of our ancient commonwealth.

My connection with the society begins as a member in 1878, when our esteemed friend leaves off. Dr. J. H. Kidder of Lawrence was president. Three only of the entire board of officers of that year are now living—Drs. D. M. Clapp, E. Page, and J. T. Codman. Essays were read by Drs. J. T. Codman, H. E. Dennett, G. F. Waters, and others, and an annual address by Dr. J. Searle Hurlbut of Springfield. This meeting was held at the Tremont House.

The fifteenth annual meeting was held at 15 Pemberton Square, Boston, December 1879. Dr. L. D. Shepard was president. The annual address by Dr. C. G. Davis of New Bedford—subject, "Hash of Cold Pieces with a New Dressing"—provoked a great deal of amusement. Other papers were by Drs. J. H. Kidder and D. M. Clapp. The society numbered 89 active members; 2 junior members; 2 corresponding members and 6 honorary members. Of the membership then 23 are still members; most of the others are dead. The honorary members have all passed away.

The society at this time held two meetings a year, annual and semi-annual. The fifteenth semi-annual meeting was held in Codman & Shurtleff's Hall, 167 Tremont street, June 1880. The society had for its guest Dr. W. G. A. Bonwill of Philadelphia, who read a paper on "Anticipation of Decay," and gave a clinic—the first which I find any mention of since the fourth annual meeting. He also exhibited his surgical engine. I remember his activity and earnestness and the interest all present took in his operations. Other papers presented were by Drs. Codman, Grant, and E. Page.

The sixteenth annual meeting was held in the same hall. The annual address was by Dr. A. M. Dudley of Salem. Other papers were read by Drs. H. A. Baker, Meriam, and Waters. The membership of 98 was active. Dr. C. G. Davis of New Bedford was president.

At the sixteenth semi-annual meeting three papers were read and a banquet given at Young's Hotel.

The seventeenth annual meeting was held in Codman & Shurtleff's Hall, December 1881. Papers were read by Drs. E. S. Niles, Meriam, Clements, Andrews, and H. A. Baker. One of the subjects for discussion was, "Is it Good Practice to Use Gold and Tin, Gold and Amalgam, or Any Two Metals in One Cavity?" The membership remained the same. Dr. G. F. Waters was president. Several amendments to the constitution were voted upon at this meeting.

At the seventeenth semi-annual meeting the society had Dr. W. H. Atkinson of New York city, and Geo. L. Parmele of Hartford, Conn., as guests, each of whom read a paper.

The eighteenth annual meeting was held in Boston, in December 1882. The annual address was given by Dr. C. A. Brackett of Newport, R. I. A paper was also read by Dr. D. D. Smith of

Philadelphia, who was a guest of the society. Dr. D. B. Ingalls was president. Of the officers all are living. Of the Executive committee all are dead but one, and he is not now a member.

The eighteenth semi-annual meeting was held in Springfield, Mass.—a union meeting with the Connecticut Valley Dental Society—June 1883. It was well attended; a large number of papers and clinics were given. Prominent among the essayists and clinicians were Drs. W. C. Barrett, New York; W. G. A. Bonwill, Philadelphia, H. W. F. Buttner, New York, and E. Parmly Brown, New York.

The nineteenth annual meeting was held in Boston in December 1883. Dr. Flavius Searle of Springfield was president. It was at this meeting that Dr. J. T. Codman read his historical paper from which I quoted at the outset of this address. Seven very interesting papers were given. Dr. E. Parmly Brown of New York was a guest of the society, and gave in addition to his paper a clinic on the "Contour Approximal Filling in a Bicuspid Without Previous Separation, by the Use of the Electric Mallet."

The nineteenth semi-annual meeting was held at the Hawthorne Rooms, 2 Park street, Boston. Seven papers were read and two clinics given. The membership had decreased to 88—a loss of 10 members.

The twentieth annual meeting was held in the rooms of the Boston Medical Library Association in December 1884. Dr. E. G. Leach of Boston delivered the annual address. E. H. Bradford, M.D., Boston, gave a paper on "Complete Ankylosis of the Lower Jaw." The patient was present. Dr. J. N. Farrar of New York was also present and read a paper on "Practical Remarks on Regulation." Other papers were read by Drs. Eames, Hitchock, Meriam, and Kidder. The membership increased to 92. Dr. D. M. Clapp was president.

The twenty-first semi-annual meeting was held in Worcester in conjunction with the Connecticut Valley Dental Society, in June 1885. Papers were given by Prof. C. N. Peirce, Philadelphia, and Drs. J. Leon Williams, New Haven, Conn.; E. C. Leach; Drs. Clapp and Niles, Boston; E. A. Stebbins, Shelburne Falls, and Shumway of Plymouth.

The twenty-first annual meeting was held in Boston in December 1885, when the annual address was delivered by Dr. D. B. Ingalls of Clinton. Drs. W. H. Atkinson and J. N. Farrar of New York, David Hunt, M.D., Boston, a prominent physician, Profs. Wetherbee and Fillebrown all read papers. Prof. Fillebrown was then a corresponding member. The membership was 94. Dr. J. F. Adams, Worcester, was president at this time. Parke, Davis & Co. advertised in the program at this meeting cocain and ethyl bromid as local anesthetics.

The twenty-second annual meeting was held in the Young Men's Christian Association Building, Boston, June 1886. Papers were given by Drs. Meriam, Shepard, and Knight. Dr. E. Parmly Brown of New York was again a guest of the society, and showed new forms of tooth crowns, all-porcelain bridge work, etc. In the evening a collation was served and speeches made, Dr. D. B. Ingalls acting as toastmaster. Ladies were present and the occasion was very pleasant.

The twenty-second annual meeting was held in the same place, in December 1886, the annual address being delivered by Dr. Thomas Fillebrown of Boston. Dr. Frank M. Odell of New York was the guest of the society and read a paper, as did also Drs. H. A. Baker, C. A. Brackett, G. C. Ainsworth, and J. K. Knight. A clinic on the use of plastic gold was held by Dr. J. A. Steurer of New York, an exhibition of porcelain facing work made in a new gas furnace was given by Dr. C. H. Land of Detroit, Mich., and of removable bridge work by Dr. E. S. Niles. The active membership was 98, with 10 honorary and corresponding members. Dr. S. G. Stevens, Boston, was president. A banquet was held on the evening of the first day in the collation room of the association.

The twenty-third semi-annual meeting was held in the Hawthorne Rooms, Boston, in June 1887, and was replete with good things. There were eight papers

which occupied the afternoon and evening of the first day. Dr. C. S. Stockton, of Newark, N. J., was the guest of the society, and read a very interesting paper on "Dentistry and Its Relation to Medicine." The second day was devoted to clinics, and related entirely to prosthetic dentistry. For the first time the society had exhibits, and nine firms were represented, among them being B. L. Knapp & Co., who have lately retired from business. Membership at this meeting 92—a loss of six.

The twenty-third annual meeting was held in the rooms of the Young Men's Christian Association Building in December 1887. Eight papers were read. It will be remembered that in April of this year a dental law was passed in Massachusetts and put in operation. Among the papers read was one by Dr. L. D. Shepard, who was president of the Board of Registration, on "Laws for the Regulation of Dental Practice." Other interesting features were the presence of Drs. Flavius Searle of Springfield and E. G. Leach of Boston, who had just completed fifty years of dental practice. Each read a paper on "The Lessons of Fifty Years in Dentistry." Dr. D. W. Fellows of Portland, Maine, was the guest of the society and read a paper on "Theories and Principles." Several clinics were given. The exhibitors numbered 16. A banquet was held at the Brunswick on the evening of the first day. After the banquet Charles W. Turner, Esq., of Boston, gave the annual address: subject, "The Aristocracies of Scholarship and Skill." Dr. E. B. Hitchcock was president. At this meeting, among others, a member was admitted whom fate destined to be an indefatigable member of this society; he is still in harness and occupies a high position in a dental society today.

The semi-annual meeting of July 1888 was the third union meeting with the Connecticut Valley Dental Society—but held in Boston this time. Dr. H. C. Meriam was president of the Massachusetts Dental Society and Dr. R. R. Andrews president of the Connecticut Valley. Several papers were read, among them one by Dr. R. Ottolengui of New York city. Dr. J. Bond Littig of New York city gave a clinic on "Porcelain Tips." Dr. W. Xavier Sudduth of Philadelphia and Dr. W. C. Barrett of Buffalo were also present. The exhibitors numbered 70 and the exhibits comprised six electric motors, one gas engine, and three water motors. The meeting was a great success.

The twenty-fourth annual meeting was held in the Young Men's Christian Association rooms in December 1888. Dr. R. Ottolengui gave a clinic on "Implantation." The annual address was by Dr. D. M. Clapp, and there were four other papers. A banquet and a vocal and instrumental entertainment was given at the Brunswick from five to eight o'clock. At eight o'clock the meeting adjourned to the Young Men's Christian Association rooms, where the members listened to an address by Prof. A. J. George of Boston on "The Evolution of Science." Several clinics were given but no exhibits made. The president during this term was Dr. H. C. Meriam of Salem; the membership on December 1, 1888, 115—a large increase, and the first time the membership ever passed the hundred mark.

The semi-annual meeting of June 1889 was held in the Massachusetts Institute of Technology, Boston, and elaborate preparations were made. A clinical conference was arranged and prominent dentists from all parts of the United States and Canada were invited and placed on the list. Essayists were procured from Virginia, Minnesota, Illinois, Pennsylvania, New York, Connecticut and Massachusetts. Clinicians were present from as many states, and embraced such men as Drs. Parramore and Chewning of Virginia, Crouse of Chicago, Noble of Washington, Sudduth and Guilford of Philadelphia, Bogue, Atkinson, and Palmer of New York—all adding their worth to the success of the meeting. The president, Dr. G. A. Gerry of Lowell, presided. The exhibits numbered 116, many being by individuals whose exhibits were of the nature of a clinic. It was by all means the most gigantic effort ever put forth by the society and was piloted to a successful ending by the

chairman of the executive committee, Dr. Meriam of Salem.

In December 1889 was held the twenty-fifth anniversary of the society. The officers at that time were Dr. G. A. Gerry, president; Drs. R. R. Andrews and Geo. F. Eames, vice-presidents; E. O. Kinsman, secretary; Edward Page, treasurer; J. King Knight, librarian. Executive Committee—Drs. H. C. Meriam, W. P. Cooke, R. F. Horne, F. A. Cooke, and J. E. Waitt. Only one of this committee has died. Two others have since left the society. The meeting was held in the Young Men's Christian Association Building, Boston. Papers were read by Drs. G. L. Parmele of Connecticut, E. W. Branigan, T. D. Shumway, J. K. Knight, C. G. Davis, G. F. Waters, J. W. Ball, and D. S. Dickerman—all members. The annual address was given by the Rev. Alexander McKenzie, D.D., of Cambridge, and was as fine an address as it was ever the society's fortune to hear. It was lost to perpetuity because no stenographer was present. Membership—active, was 116—junior 4. The exhibits numbered 24. The meeting was largely attended. The time of the annual meeting was changed to July of each year, so that the next annual would not be held until July 1891.

In 1890 a union dental meeting was held in Berkeley Hall, Boston, October 28th to 31st, composed of the following societies: The several New England state societies; the American Academy of Dental Science; Harvard Odontological Society; the Alumni Association of Harvard Dental School; the Alumni Association of Boston Dental College; Boston Society of Dental Improvement; Connecticut Valley Dental Society; Worcester Dental Society; the New England Dental Society. Among the most prominent papers may be mentioned those by Babson S. Ladd, Esq., of Boston, on "Some of the Rights and Duties of Dentists at Common Law;" Dr. J. N. Crouse on "The Dental Protective Association;" Dr. A. W. Harlan, "The Dental Pulp;" Dr. R. R. Andrews, "The Development of the Enamel;" Dr. W. P. Cooke, "New Formations in the Pulp Cavity." Eighteen clinics were given and the exhibits numbered 50. The meeting was a great success.

The twenty-sixth annual meeting was held in Boston in July 1891. Ten papers were read. Dr. W. C. Barrett of Buffalo was the guest of the society, the subject of his paper being "Developmental Dental Eras." The annual address was made by Dr. J. H. Daly of Boston. Dr. R. R. Andrews of Cambridge was president for the term. There were 117 active members and 8 junior members.

The twenty-seventh annual meeting was held in the Massachusetts Institute of Technology in July 1892. Nine papers were read. The president's address was delivered in the evening of the first day's session, the subject being "Health as a Potent Factor in Professional Success," illustrated with lantern slides. The annual address was by Dr. L. D. Shepard of Boston, entitled "Changes that are Necessary to Make the Massachusetts Dental Society More Efficient as a State Society." This paper marked the beginning of the agitation on the necessity for dividing the society into districts. A paper was read by Dr. Walter Channing, the eminent alienist, on "A Study of Idiots' Palates." Seven or eight clinics were given at the Boston Dental College Infirmary. Dr. Geo. F. Eames was president. Membership comprised 114 active and 9 junior members.

The twenty-eighth annual meeting was held in Boston in June 1893. Five papers were read. In the evening of the first day a banquet was given. The annual address was made by Rev. E. Winchester Donald, D.D., rector of Trinity church, and was followed by a paper entitled "The Relations Between the Forms and Functions of the Teeth," by Prof. Harrison Allen, M.D., of Philadelphia. Vocal and instrumental music and readings were interspersed during the banquet. Clinics were held in the Infirmary of the Boston Dental College. Dr. J. W. Ball was president.

The twenty-ninth annual meeting was held in the Massachusetts Institute of Technology in June 1894. At this meeting the committee to report on district

societies, Dr. L. D. Shepard, chairman, made its report favoring the project; the society voted to organize them and appointed committees to carry out the provisions of the bill. The state was to be divided into seven districts, denominated the Northeastern, the North and South Metropolitan, the Southeastern, the Central, the Valley, and the Western districts, each district to elect a secretary and treasurer and five councillors. The business of the parent society to be done by the thirty-five councillors. The president and secretary of the parent society to be president and secretary ex-officio, respectively of the Board of Councillors. Twelve papers were read, among them one by Dr. Robert W. Greenleaf of Boston, on "Foods;" one by G. A. Leland, M.D., of Boston, on "Obstructed Nasal Respiration, Adenoids, etc.," and one by Dr. J. N. Crouse of Chicago on "Painless Dentistry." A banquet was held on Thursday evening at the Thorndike. The annual address was given by Rev. Edward A. Horton of Boston. The society had as guests, Governor Greenhalge, Lieut.-Gov. Wolcott, and President Eliot of Harvard. This was the largest and most successful banquet held by the society. Dr. W. E. Page was president, the society numbered 127 active members—the largest in its history. The society amended its laws so that all registered dentists of the state, whether possessing degrees or not, were eligible to membership, thus doing away with the junior membership.

When the society assembled in June 1895 for its annual meeting the districts had become an actual fact. Four were organized in January 1895, two in February, and one in April. The first councilors' meeting was held and business of the society transacted, hearing all reports of officers and committees, and electing the board of officers for the ensuing year. The membership had increased to 154 active members. The society seemed to be on the upward track. Eight papers were read, several questions were discussed, and a number of clinics given. A banquet was held. Lieut.-Gov. Wolcott was a guest and made a short speech. Dr. J. E. Cravens of Indianapolis was also a guest. The annual address was by Rev. James DeNormandie of Boston. Dr. Jos. King Knight of Hyde Park was president.

The thirty-second annual meeting was held in Harvard Dental School June 1896. Eleven papers were presented, several by outside talent. Papers read were "The Restoration of Badly Broken Teeth Without Crowning," by S. E. Davenport, D.D.S., New York. "Reparative Operations in the Region of the Mouth," by George H. Monks, M.D., Boston. "Skin Diseases, Their Relation to Dentistry," by William H. Ruddick, M.D., South Boston. "Modern Methods of Cocain Anesthesia," by Samuel J. Mixter, M.D., Boston. "Certain Manifestations of Syphilis of Importance in the Practice of Dentistry," by Charles M. Whitney, M.D., Boston, and "Local and Systemic Acidity—Cause, Effects, and Treatment," by Wm. H. Milliken, M.D., Boston. Fourteen clinics and demonstrations were given. Exhibits were again made after an interval of several years; twenty-three firms or individuals participated. A banquet was given at Young's Hotel, and the society had as guests Mrs. Mary A. Livermore and the Hon. Harvey N. Shepard of Boston. Mr. Shepard delivered a very interesting address and Mrs. Livermore made a short speech. The first year of the districts was a success. Dr. George A. Maxfield was president.

The thirty-third annual meeting was held in Harvard Dental School in June 1897. Ten papers were read, including the president's address, eleven clinics given, and discussions took place on questions furnished by the American Dental Association. There were no exhibits and no banquets. The membership had increased to 210 active members. Dr. Waldo E. Boardman of Boston was president.

At the thirty-fourth annual meeting held in June 1898, in the Massachusetts Charitable Mechanic Association Building, Boston, six papers were read. One by G. Alden Mills of New York was entitled "An Advance Step in the Treatment of Riggs' Disease, *versus* Pyorrhea

or Idiopathic Alveolitis." Another paper was entitled "A Report of Corrected Deformities of the Teeth, and Change in the Shape of the Natural Teeth," by Dr. Robert E. Payne of New York. The clinics numbered eleven. A banquet was given in Young's Hotel open to members of the society and dental friends. The president was Dr. Sidney S. Stowell of Pittsfield. Membership the same as in the previous year.

The thirty-fifth annual meeting was held in Hotel Oxford June 1899. Seven papers were read besides the president's address. At the banquet in the hotel in the evening several papers were read. One was by Dr. S. B. Palmer of Syracuse, N. Y., "Influences that Retard Evolution in Dental Science," and another by Dr. E. A. Bogue of New York, "Results that Follow the Extraction of Permanent Teeth." Seven clinics were given. Exhibits were plentiful and of a good order. Membership, 216 active. Dr. Harry S. Draper was president.

The thirty-sixth annual meeting was held in the American House in June 1900. Ten papers were presented. The especial feature of this meeting was a paper and clinic by Dr. W. A. Capon of Philadelphia, on "Porcelain Inlays, Crowns, etc." An entire afternoon was devoted to Dr. Capon's clinic, which was well attended and very instructive. Six other clinics were given on the following morning. The exhibits were on a large scale. A special supper was given June 6th, and many members and others were present. Dr. George A. Lowe of Rockport was president. During the past three years some of the district societies had lagged and not kept up the best interest, so that consolidation of these districts and change of name was considered. This resulted in the consolidation of the North and South Metropolitan and Northeastern districts into one, to be called the Metropolitan. The Southeastern, almost extinct, was stimulated into renewed activity by Dr. Faxon and others. Its life was saved and today it is the largest outside of the Metropolitan. The society has five districts now, all in active service.

The thirty-seventh annual meeting was held in the Institute of Technology June 5 and 6, 1901, and proved to be of exceptional interest. It was devoted entirely to papers and clinics. Five papers besides the president's address were given. Twenty clinics as varied as the number were given and proved both instructive and interesting. The banquet held at Hotel Brunswick was a grand success. Among the speakers were numbered the late lamented President Capen of Tufts College, Drs. E. C. Kirk of Philadelphia, B. Holly Smith of Baltimore, and the deans of the Harvard and Tufts dental schools. The membership numbered 299 active and 9 each of honorary and corresponding members. Dr. John F. Dowsley was president.

The thirty-eighth annual meeting was held in Hotel Brunswick, Boston, June 4 and 5, 1902. Six papers were read, all by outside essayists: Dr. Walter F. Bisbee, Camden, Me.; Dr. E. C. Kirk, Philadelphia; Dr. H. E. Eaton, Toronto, Ontario; Dr. Jos. Head, Philadelphia; Dr. L. P. Haskell, Chicago. Dr. J. N. Crouse, Chicago, gave "A Résumé of Fifty-seven Years of Prosthetic Dentistry." At this session appeared for the last time our honored and respected member, Dr. Isaac J. Wetherbee. He died three weeks after the close of the meeting, at the age of eighty-five years. Twenty-one clinics were given; exhibits formed an important feature. The banquet was given in the hotel, the topic for after dinner being: "The Law in Relation to the Practice of Dentistry." The speakers were Hon. J. A. McGeough, a lawyer, of Boston; Drs. James Truman, E. C. Kirk, S. H. Guilford, and Joseph Head of Philadelphia; Geo. L. Parmele of Hartford, and J. Searle Hurlbut of Springfield. Before the next annual meeting Dr. Hurlbut had also passed on to the great majority. The membership still continued to increase, numbering 341 active members. Dr. Frederick S. Faxon of Brockton was president. In the compiling of membership, a new feature was developed this year, in getting from each member the degrees, the college and date of graduation, the year commencing prac-

tice and of joining the society, making an extremely valuable list. This was the work of Dr. Waldo E. Boardman, and much credit should be accorded him for the time and labor expended.

The thirty-ninth annual meeting was held in the Massachusetts Charitable Mechanic Association Building, Boston, in June 1903. Eleven papers were presented. The following guests of the society read papers: Dr. D. Rankin Stubblefield of Nashville, Tenn.; Drs. W. J. and W. R. Roe, Philadelphia; A. G. Menshall, M.D., Northampton, Mass. Twenty-eight clinics were given. There were 35 exhibitors. A banquet was given at the Lenox on the evening of June 3d, when the speakers and guests were: Dr. Edwin T. Darby of Philadelphia, Miss E. A. Kimball of Worcester, and Rev. Philip S. Moxom, D.D., Springfield. The active membership was 379. Dr. Andrew J. Flanagan of Springfield was president.

The fortieth annual meeting was held in the Massachusetts Charitable Mechanic Association Building June 1 and 2, 1904. Eleven papers were read and 45 clinics given. The principal guest of the society was Dr. Arthur E. Peck of Minneapolis, Minn., who read a paper on "Porcelain Inlays" and also gave a clinic. The exhibits were over 50 in number and made a most elaborate display. This year, for the first time, owing to the large increase of attendance, many who in the past had partaken of the benefits of the society without contributing to its support financially were not invited. Tickets were issued to members and guests. No dentist registered in Massachusetts, not a member was eligible to admittance unless he applied for membership. This led to a number filing applications, and the plan was considered a success. Active membership was 405. The membership today is, active 470, honorary 7, corresponding 9. In 1895 when the districts were formed, the total active membership was 127. Today it is nearly 500—a great increase, but not as large as it should be—divided as follows: Metropolitan, 274; Southeastern, 71; Valley, 69; Central, 38; Western, 18.

In each of the districts active members are putting in their time, energy—yes, money—to make the Massachusetts Dental Society a power not only in our own commonwealth but in the country at large. She has nobly elevated the standard of our profession and will do even more as the years go by. Great things can and will be accomplished if her members will fully realize that they owe the society a duty and will live up to that duty. We should have double our present membership and double the power for good. The reputation of this society depends greatly upon the character of its past and present members. It, therefore, becomes us to place as high as possible our standard of excellence, and carefully guard against the admission to our ranks of those who occupy a doubtful or low position in our profession.

In our long period of growth, those of us who have been in the society over 25 years (there are only 22 who can claim that distinction*) have seen many changes. To make a personal application (and I beg pardon for so doing) I feel proud of the fact that since I joined in 1878 I have never missed a meeting of the parent society during the course of my official service of eighteen years now drawing to a close. I will say that I have striven to do my best according to the light that has been given me, and I cannot pause without publicly thanking the board of officers and the Executive Committee for their more than faithful service during the past year—a working

* The twenty-two oldest members are: John T. Codman, 1864; Samuel J. MacDougall, 1864; Edward Page; L. D. Shepard, 1865; Charles Wilson, 1870; Albert B. Jewell, 1871; T. O. Loveland, 1871; Robert R. Andrews, 1873; Albert W. Tenney, 1873; Horatio C. Meriam, 1874; Dwight M. Clapp, 1874; W. S. Macdonald, 1876; Eugene H. Smith, 1876; Washburn E. Page, 1877; Ezra F. Taft, 1878; Edgar O. Kinsman, 1878; L. B. Dutton, 1878; George C. Ainsworth, 1878; Edward S. Niles, 1879; T. W. Clements, 1879; A. G. Bouvé, 1879; J. W. Ball, 1879. Of 37 presidents 22 are living, all but two being still members. Of 14 secretaries 11 are living, of whom 10 are still in the society. Of 4 treasurers, all living, all are still members. 311 members have joined since and including 1900.

committee every one of them, in every sense of the word, doing all that success might come, and I leave you to decide whether it has not been well done. God bless the Massachusetts Dental Society! and as the years go by may she prosper, increasing by each successive mile-stone. Her struggles, her triumphs, the men who have made her what she is, will always be remembered. Let those who have her welfare at heart in the future not lack in anything that makes for good and her perpetuity will be assured.

The President resumed the chair and announced as the next item on the program a paper by Dr. EUGENE S. TALBOT, Chicago, Ill., on "Interstitial Gingivitis."

[This paper is printed at page 1310 of the November issue of the COSMOS.]

Discussion.

Dr. S. A. HOPKINS, Boston. I want to say a word with regard to the disease the essayist has spoken of. I believe that there are men who have practically eliminated this disease from their practice. That seems a rather astonishing statement, and it does need qualification. I mean this, that setting aside the cases which come from systemic disorders, as Dr. Talbot has suggested, setting aside those general systemic conditions which cause repeated and constant outbreaks of the disease, and confining ourselves to those cases which come from local conditions, I would make this assertion, that if the patient is under the dentist's control, if the patient goes to the dentist regularly, and is seen by him at sufficiently frequent intervals, it is the dentist's fault, and he alone is responsible if this disease arises and makes progress. It is due to neglect in ninety-nine cases out of a hundred. We cannot control patients that come to us at intervals of six months, one year, two years, or four years, as the case may be. The only thing we can do is when we see signs of the disease to call their attention to it, and urge proper treatment. But when we can have the patients under our control, I believe the disease should be entirely eliminated from the modern dental practice.

Dr. THOMAS FILLEBROWN, Boston. The paper just read by Dr. Talbot is one of the best I have ever listened to upon this subject, and the lantern slides are exhibitions of the perfection of the art of photography.

The treatment recommended, I have for forty years found most efficient, and none of the more modern modifications have exceeded it in producing favorable results. My experience also agrees with Dr. Talbot's remarks on the cause and care of gingivitis. The cause is local irritation; the cure is first of all the removal of all local irritation, and afterward constant cleanliness; these accomplished, the disease is cured and will remain so. The application will hasten a cure by destroying the infection and stimulating the tissues to greater activity. Systemic treatment that improves the general conditions helps to the same end. Without the complete removal of all local irritations all other treatment is *nil*. It may relieve a little, but never cure. One case to the point: I have a patient now, a robust woman of thirty, always healthy from birth. At nine years of age she had well-developed gingivitis around the lower central incisors, which came on during a not very prolonged absence. Pus was present in considerable amount, but complete removal of the irritating causes and applications of iodin for a short period cured the disease. She has had no return of the trouble.

Dr. A. J. FLANAGAN, Springfield. In the work of Dr. Talbot there is a condition, as shown in the illustrations and in the paper, where true recession exists with no systemic condition and no local irritation. I would like Dr. Talbot to explain something of the treatment of such a condition. Can there be any treatment? Is not that a normal wasting of the tissue? If I am judging the work of Dr. Talbot correctly, we are treating many cases where there is no cure, although Dr. Fillebrown and Dr. Hopkins say it can be cured, and it seems to me that they differ radically with the paper.

I would like to ask Dr. Talbot if he considers where we have a pus condition in the mouth in which instruments are used and not properly cleaned afterward, if we could inoculate another person by introducing pus into the system. The essayist speaks of iodin. There are many ways of using iodin, and I would like to ask if he uses the official tincture or the so-called dental tincture. These are points which seem to me to need some explanation, and I would like to have information on these few questions.

Dr. Talbot (closing the discussion). I agree with the first two gentlemen in regard to healthy mouths. You will find in dental literature an article by Dr. Bonwill in which he said he did not have this disease in his practice. We all know that he was an enthusiast in making his patients use the tooth-brush. It is simply gum massage which prevents patients from having this disease to any great extent. Bonwill kept the mouths and teeth of his patients clean, because they came to his office at stated intervals. He made them brush their gums as well as their teeth. Everyone can do the same thing. We can in this manner reduce interstitial gingivitis to a minimum; but in answer to the question of the last speaker, the inflammation progresses no matter how much the gums are brushed. The character of the resorption can be altered, but it will go on, since it is a natural process.

With regard to iodin: After years of experimenting, the formula presented in this paper is the best thing we can use. In the first place the ordinary tincture of iodin flows over the mouth too freely if it comes in contact with the saliva. Secondly, it is not strong enough and does not absorb quickly enough. Take a piece of orange-wood with a thread of cotton wound around it and dip into the preparation for use throughout the mouth. Have the patient open the mouth, and apply on the lingual sides of the gums first, the palatal surfaces of the upper and lower jaws. The preparation dries immediately. Then have the patient close the mouth, hold the lips open and paint around the margin of the gums, upper and lower. Hold the lips open a moment until the medicament absorbs. This preparation has an astringent, tonic, and healing effect. The glycerin causes rapid absorption and aids healing.

Dr. Flanagan. Have you conducted any experiments whereby an unclean instrument (for instance, with pyorrhea pus on it), if introduced into a healthy mouth where there is no senile atrophy —are there any records showing that so-called pyorrhea can be thus produced?

Dr. Talbot. There are two records of this character of experiments. Dr. Carpenter of Chicago commenced a series of experiments. He took pus and tried to inoculate patients, but was unable to do so. This was done in certain selected patients. Dr. Carpenter tried repeatedly and I have tried it, but it is impossible to obtain the disease in that way. Those experiments are on record.

Dr. Flanagan. One other question. Dr. Hopkins spoke of this treatment, which is so well known, as Dr. Smith's— that is, the manner of massaging the teeth by what is known as Dr. Smith's method. Now, Dr. Smith claims that you must have hand movement. Has it been the experience of Chicago men that it is necessary to massage the teeth by the hand movement?

Dr. Talbot. The literature for many years has been full of massaging the gums with the fingers. It cannot be done that way, because it does not make the gums bleed. It is necessary to use the coarsest bristle brushes. All patients cannot use them, but most can. The gums will get sore at first, but the object is to remove the blood just as the leech would remove the blood. The more the gums are injured in removing the deposits and getting the blood away from the parts, the quicker they will heal. The stiff brush is necessary for this. It is impossible to get between the teeth (where the festoons are) with the fingers.

Dr. Flanagan. What I meant is this: Dr. Smith takes wood points held in an instrument, and with these uses pumice-stone and certain mouth-washes, and he claims that he has been able to cure pyorrhea by the stimulation of the os-

teoclasts; by the smoothing and polishing of the enamel he claims that he has been able to cure pyorrhea cases. I would like to find out if the practitioners of Chicago agree with that. It seems to me that your theory is diametrically opposed to that. If you had lived in the East long, you would have heard of Dr. Smith's method.

Dr. TALBOT. I know nothing of the Smith method. You can readily see, however, if a man has Bright's disease, that treatment would not do. Again, if he had inflammation, or injury below the gum margin, or down on the root of the tooth, that treatment would not do.

Dr. N. A. STANLEY, New Bedford. I would like to report a case which came to my attention recently. It was a case of pyorrhea where the pus pockets were quite deep around the molar teeth. I last treated the case in September or October. The patient came to my office two weeks ago, and I found the gums in a most excellent condition. The teeth had no deposits on them whatever, there was not a particle of pus discharging, and the characteristic odor of pyorrhea was conspicuous by its absence. I knew nothing that I had done brought about this condition. In conversation with the patient he told me that he had eaten no meat for several months, and as a result he said he had been in better physical condition than he had been for a long time. I have little doubt that that effected the change in his mouth.

On motion the subject was passed, and the meeting adjourned until Thursday afternoon at 2 o'clock.

(To be continued.)

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PHILADELPHIA, DECEMBER 1905.

EDITORIAL DEPARTMENT.

THE QUESTION OF A MOUTHPIECE.

AT the annual prize distribution of the Royal Dental Hospital, London, October 13, 1905, Professor Osler, M.D., F.R.S., Regius Professor of Medicine at the University of Oxford, delivered an address upon "The Dental Student's Ideals," which address is published at page 1002 of the *British Dental Journal* of November 1, 1905, and in the same issue considerable editorial comment of a favorable character is made upon it. Several dental periodicals have published excerpts from the address, not a few medical magazines have noticed it, and the New York *Sun* of Sunday, November 12th, devotes over a column of its editorial page to a further favorable critique upon the same utterance.

It is on the whole an unusual circumstance that anything said by anyone on the subject of dentistry or of the teeth should command such general attention. A prominent medical teacher was so much impressed by the excellent features of Dr. Osler's address that in the midst of a busy practice he found time to clip the New York *Sun* editorial and forward it to the Editor of the DENTAL COSMOS as being worthy of special attention because of its inherent interest.

An analysis of the address reveals the several contentions of its author as follows:

First. Dentistry is a scientific profession.

Second. In his relations to his art, the functions of the dentist are three, viz: (*a*) the relief of suffering; (*b*) to increase the digestive capacity of the public; (*c*) to help beautify the race.

Third. In his relations to the public the dentist must be a missionary, a propagandist of the following ideas for the betterment of public health, to wit:

(1) By advocating the cult of the tooth-brush, to the end that the mouth and its contained organs may be kept more generally in a clean and hygienic condition.

(2) By the routine inspection of the teeth of school children.

(3) By persistently educating the public along these lines so that better nutrition and consequently better health may be secured to the public.

These several suggestions and recommendations were enforced by cogent arguments and happy illustration in that attractive and readable style of diction of which the distinguished author is a recognized master. But divested of all the force and charm which the position and personality of the author confer upon his utterance, we are confronted with the cold fact that these same sentiments have been taught and advocated for many years past in every dental educational institution, every dental society, and every dental text-book and periodical throughout the civilized world. They have been discussed in their local, national, and international aspects; and yet, when expressed through the agency of the Regius Professor of the University of Oxford, these familiar thoughts come with all the emphasis of originality—of a new discovery, and the world stops its business just long enough to hear the tale. Verily it is important to speak as one having authority and not as the Scribes.

Dentistry has sung this same song through the whole gamut, in tones like the roaring lion and in the gentle cadences of the sucking dove, and is still lifting up its voice to the same theme; but the public ear is guided in matters of health, even the health of the teeth, by the advice of the physician, for he speaks with authority, and, in the case of the teeth, usually with more authority than knowledge. Hence arises the difficulty which confronts the dentist in impressing the public mind with the truths advocated by Professor Osler. But the truths even of dentistry ultimately prevail, like all other truths, and no small evidence of that fact is furnished by the vicarious triumph which some of our elementary dental contentions have achieved in respect to an appreciative public hearing through their advocacy by the Regius Professor of Medicine of the University of Oxford. From which we reach the conclusion that in order to most effectually convert the public to the ways of dental rectitude, we must begin by converting our medical *confrères.*

BIBLIOGRAPHICAL.

A TEXT-BOOK OF PHYSIOLOGY, NORMAL AND PATHOLOGICAL, FOR STUDENTS AND PRACTITIONERS OF MEDICINE. By WINFIELD S. HALL, PH.D. (Leipzig), M.D. (Leipzig), Professor of Physiology, Northwestern University Medical School, Chicago, etc. Second Edition, revised and enlarged. Illustrated with 340 engravings and 3 colored plates. Philadelphia and New York: Lea Brothers & Co. 1905.

A careful examination of this well-planned and exhaustive treatise will inevitably lead to the conclusion that from a general medical viewpoint it fully deserves the leading position to which it has risen since its first appearance in 1899. When we consider that the subject of which it treats is the foundation of rational pathology, general diagnosis, and therapeutics it becomes at once evident that a thorough knowledge of the functions of the cellular units of the body is the keynote to the intelligent and successful practice of the art of healing. This of course applies not only to the general practice of medicine but equally as forcefully to the practice of all the well-defined specialties of the mother science. The pathologist, the therapeutist, and as a matter of fact the human healer must be first, last, and always a reasonably competent physiologist. It is therefore regrettable from a dental standpoint that the author should have dismissed that part of the subject which should have been devoted to a comprehensive study of the functions of the oral cavity and its contained organs, after a very incomplete allusion to the functions of the tissues with which the dental surgeon concerns himself. From a purely dental standpoint the book cannot be considered in the light of either a study or reference work, for in the fifteen lines devoted to this portion of the subject hardly more than passing reference has been made to this phase of human physiology.

The physiology of tooth-evolution, the eliminative functions of the oral mucous membrane, the significance of the mouth as a part of the digestive apparatus, etc., are topics of which we believe a liberal discussion would have proved beneficial to both medical and dental students.

It is not to be implied from the foregoing criticism that the author has not discussed in connection with his studies of digestion the functions of the salivary secretion and of the oral glandular contents. What we mean specifically is that total omission has been made of a *vue d'ensemble* of the mouth and teeth.

Apart from this unfortunate omission, the book possesses many valuable features, the portions on pathologic physiology being indeed additions of inestimable value to the previous edition. They occur as sub-chapters at the end of the chapters on Circulation and Blood, Respiration, Digestion, Metabolism, and Excretion. A liberal number of diagrammatic illustrations facilitate to a marked degree the understanding of the many complicated features of the physiological problem and render the book conspicuously attractive.

J. E.

REVIEW OF CURRENT DENTAL LITERATURE.

Conducted by JULIO ENDELMAN, D.D.S.

[*Gazette des Hôpitaux*, Paris September 14, 1905.]

PERFORATING DISEASE OF THE MOUTH: ITS RELATIONSHIP WITH PERFORATING DISEASE OF THE FEET IN TABETICS. (Mal Perforant Plantaire Tabetique.) By Drs. Gaucher and Dobrovici.

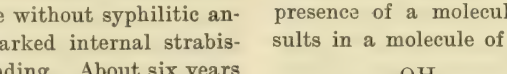
The authors report the case of a woman forty-eight years of age without syphilitic antecedents and with marked internal strabismus of eight years standing. About six years ago she lost spontaneously all the upper teeth except the left third molar. At the time of presenting this report the patient exhibited a condition of tactile insensibility accompanied by severe pain upon the mucous membrane covering the border of the maxilla and likewise upon a portion of the palatal and buccal tissues. The alveolus underwent complete absorption shortly after the shedding of the teeth. Sensibility remained normal in the pharynx, lips, mandible, and tongue. The sharp paroxysmal pains appeared about one year ago and were followed six months afterward by the appearance of the plantar perforating disease under the big toe of the right foot at the level of the metatarso-pharyngeal articulation and under the second and third toes of the left foot.

As the patient had always had perfectly sound teeth all infections or traumatic cause had to be eliminated from the etiology of the pathological changes which led to the exfoliation of the teeth and to the subsequent disorders. The cause is attributed by the authors to trophic changes in the superior maxillary nerve in view of the fact that the manifestations were limited to the tissues supplied by this nerve. The diagnosis of the trophic nature of the disorder is further confirmed by the co-existing lesions in the feet, at present generally recognized as being the result of peripheral neuritis consequent upon trophic nerve changes.

[*l'Odontologie*, Paris, October 15, 1905.]

VANILLIC ACID IN LOCAL ANESTHESIA. By A. Andy, Professeur Suppléant at the Ecole Dentaire de Paris.

The chemical similarity between guaiacol and vanillic acid led the author to suppose that vanillic acid might possess such anesthetic properties as are exhibited by the creasote derivative. A molecule of guaiacol in the presence of a molecule of carbon dioxid results in a molecule of vanillic acid. Thus,



Guaiacol. Carbon dixoid. Vanillic acid.

Vanillic acid may consequently be designated as guaiacol-carbonic acid.

The combination of guaiacol with carbonic anhydrid does not alter the phenol and mixed-ether characteristics of guaiacol, and consequently the resulting compound (vanillic acid) must necessarily exhibit anesthetic properties of an intensity at least equal to those of guaiacol. Furthermore, the chemical formula of guaiacol is indicative of another important characteristic, namely its innocuousness. This was amply proved by a number of experiments upon guinea-pigs, which showed that they will withstand without any discomfort a dose of sodium vanillate of twenty-two centigrams or over per kilogram of body weight.

The experiments begun upon these animals were continued by the author upon himself. He reports that in one-tenth per cent. solution it causes when first injected a burning sensation which lasts about two or three seconds. This is immediately followed by cutaneous anesthesia which lasts from a quarter to three-quarters of an hour upon a radius of about an inch.

From the foregoing the author concludes: First, that vanillic acid in the form of sodium vanillate has true anesthetic properties. Second, that anesthesia manifests itself immedi-

ately after the disappearance of the burning sensation which follows the introduction of the agent into the sub-dermal tissues. Third, that the anesthesia lasts sufficiently to permit of the performance of short operations. Fourth, that vanillic acid is absolutely innocuous, the dermal tissues presenting no phenomenon of induration or any other apparent tissue alteration following the injection.

Mr. Andy has applied the newly discovered property of vanillic acid to the extraction of teeth, and although his experience is thus far rather limited, the results have been such as to augur for this new agent a conspicuous place in the dental pharmacopeia.

In combination with cocain it presents the advantageous feature of inducing perfect and lasting anesthesia with a minimum amount of cocain, thus decreasing considerably the possibilities of post-anesthetic accidents. To the one per cent. solutions of cocain ordinarily employed from one to five centigrams of sodium vanillate may be added, although a single centigram of the compound seems to sufficiently increase the anesthetic effect of cocain in order to obtain absolute insensibility with as small a dose of the alkaloid as one centigram.

[*Berlin klinische Wochenschrift*, Berlin, June 13, 1904.]

A CASE OF BLENNORRHAGIC STOMATITIS. By Dr. Juergens.

While the pathogenic agent of a certain type of inflammatory disturbances of the oral mucous membrane in children has been found to be the gonococcus, in adults it is indeed a rare occurrence to observe stomatitis in which the direct cause can be traced to the microbe of specific urethritis.

The case reported by the author was that of a man suffering from severe stomatitis involving the entire lining of the mouth. The morbid process was particularly intense in the vicinity of the gums which were covered by a layer of greenish fetid matter easily removable, although the slightest contact of the instrument brought about a sanguine exudation. Around the lower molars and in the region of the chin the superficial epithelium had undergone a destructive process, and in its stead several ulcers had formed. The pain was so severe that it was with difficulty only that the patient could open the mouth. At night the secretion of the inflamed tissues was so abundant that it interfered decidedly with the patient's rest and comfort. The treatment which at first proved unavailable had consisted in the use of solutions of potassium chlorate, aluminum acetate, potassium permanganate, etc. The phenomena did not abate until the use of mercuric chlorid solution one-tenth to one-seventh of one per cent. As the patient had suffered shortly before the onset of the stomatitis from an attack of specific urethritis, it could have been supposed that the gonococcus had been a factor in its causation. A bacteriological examination, however, revealed the presence of a number of fusiform spirillæ and bacilli (such as found in the case of Vincent's angina) and no gonococci. It was after repeated and careful examinations only that the specific diplococcus was finally discovered. Inoculations from the greenish gingival deposit in a Wertheim culture medium confirmed the diagnosis of blennorrhagic stomatitis.

[*Lancet*, London, October 7, 1905.]

ETHYL CHLORID AS A GENERAL ANESTHETIC. By Dr. W. J. McCardie.

After reviewing the history of ethyl chlorid and describing its physical properties the author states that purity is the most important requirement for the successful administration of this anesthetic. The drug should not have an acid reaction and should be absolutely free from any trace of hydrochloric acid. Many inhalers have been devised for the combined administration of ethyl chlorid and ether, but according to Dr. McCardie all that is needed is a bag inhaler of wide bore which can at any time be used for etherization if ethyl chlorid should prove insufficient or unsatisfactory. He uses a modification of the Clover inhaler, fitted with a two-way stopcock by which connection with the bag can be opened or shut so that air can be gradually shut off and the ethyl chlorid turned on. For the administration of ethyl chlorid to precede etherization the author uses from three to four cubic centimeters of the chlorid. It is important that the patient should breathe very quietly, for quiet respiration is the most important point in the induction, since it pre-

vents sensations of choking. After seven or eight inhalations the ether is gradually allowed to enter the bag. The author believes that ethyl chlorid is an ideal preliminary to etherization, more especially in the case of smokers, alcoholics, and nervous patients.

Regarding somnoform, it is stated that it does not offer any advantage, but that it is less safe than ethyl chlorid for the reason that one of its components is ethyl bromid, and secondly because the last few doses are liable to decompose and to produce serious effect during or after the inhalation.

Discussing the death-rate of ethyl chlorid, the author describes a series of seven cases which he has collected. The first death occurred in the practice of Lotheisen at Innsbruck. The patient was an alcoholic. The necropsy showed hypertrophy and fatty degeneration of the heart, sclerosis of the coronary arteries, and the blood of a bright cherry-red color like that observed in cases of carbonic acid poisoning. The second death was reported by Bossart. It occurred during tracheotomy for stenosis of the air passages from diphtheria in a child one year of age. Death occurred from cardiac paralysis. The third death was that of a patient age twenty-eight suffering from incarcerated hernia. The fourth death was that of a man who was suffering from a malignant swelling of the mandible. At the post-mortem examination the growth was found to press against the larynx and the left vocal cord was markedly swollen and edematous. The fifth case was that of a woman suffering from the last stages of dropsy due to cardiac trouble. The sixth case was that of a man suffering from a large abscess in the mandible which tended to point inward near the tonsil. The post-mortem showed considerable edema of the mucous membrane around the glottis. The seventh death occurred in the course of a dental operation and the post-mortem examination revealed a congested condition of the lungs and a chronic inflammation of the throat and larynx.

It would appear from the foregoing cases that ethyl chlorid, like nitrous oxid and ether, is dangerous where there is swelling about the larynx, and that possibly any spasm visible in the jaw muscles may be in certain cases coincident with or cause the spasm in the larynx. It is not possible to collect absolutely accurate statistics, but the mortality is somewhere near 1 in 10,000 cases.

Speaking comparatively, Dr. McCardie says that ethyl chlorid is nearly as safe as ether but by no means as safe as nitrous oxid, which is still in a class by itself. The dangers of ethyl chlorid anesthesia would seem to be chiefly on the side of respiration. Too concentrated vapor is said to cause cyanosis and asphyxia. Ethyl chlorid lowers blood pressure. Syncope during administration seems to be rare, although Lotheisen records one case; this is a fortunate circumstance, as it can be considered as the most serious among the after-effects of ethyl chlorid anesthesia. This occurs principally after a single complete dose to which no fresh air has been allowed. This type of after-effects has been observed principally in connection with dental cases. Severe cases of vomiting lasting many hours have also been recorded, and the author reports an extreme case in a child eleven years of age which lasted thirty hours.

Discussing the applicability of ethyl chlorid to dental practice the author re-emphasizes what he has stated in previous communications, namely, that the anesthetic should not be used in dental practice if suitable anesthesia can be obtained under nitrous oxid, for the reason that it is less safe, and secondly because of the severity and frequency of such dangerous and annoying after-effects as collapse and vomiting. He has administered it in full doses to patients who as a consequence of it have been faint and ill for from one to two hours. In dental practice, however, ethyl chlorid is advisable in the case of patients who have taken gas badly, for alcoholics, patients with trismus, hysterical patients, and small children. To small children under ten years of age and big children under eight years of age, unless the operation to be performed is very short or simple, the author invariably administers ethyl chlorid instead of nitrous oxid.

The contra-indications to ethyl chlorid are disturbances of the upper air passages, such as inflammation or narrowing in or about the larynx, namely swelling or edema. Patients suffering from goitre take it well unless there be marked dyspnea or stridor.

In concluding, the author states that ethyl chlorid occupies a position as an anesthetic about midway between nitrous oxid and ether.

It is more toxic than nitrous oxid and when used in properly selected cases is nearly as safe as ether. Nitrous oxid as regards safety is still in a class by itself and should be administered whenever possible. Ethyl chlorid should be used as a substitute for chloroform and ether rather than as a substitute for nitrous oxid. For short operations needing longer and deeper anesthesia and greater muscular relaxation than nitrous oxid or nitrous oxid and oxygen combined ethyl chlorid is of great advantage.

As a preliminary to etherization it is unequalled. In cases where there is very much thickening of the tissues of the neck or any suspicion of laryngitis or edema of the larynx or where there is a narrowing of the air passages beyond the mouth it is contra-indicated.

[*Annales d'Hygiene Publique et de Médecine Legale*, September 1905.]

POISONING WITH COCAIN. By Professor P. Brouardel of the Faculty of Médecine of Paris.

In this extensive communication the author refers to many points on the pharmaco-dynamics of cocain of interest to the practitioner of dentistry. In the first place it should be remembered, he says, that the mucous membranes owing to their great vascularity absorb the alkaloid with more readiness than any other class of tissue, and furthermore that the absorption is even greater when they are the seat of inflammatory processes. While in a general way it may be said that adults tolerate without discomfort doses up to five centigrams in solutions of one to two per cent., in dental practice never over three centigrams should be injected.

Poisoning with cocain may be divided into two groups, namely, acute and chronic. Generally the first symptoms of acute cocain poisoning supervene ten or fifteen minutes after the injection, but sometimes not before half or three quarters of an hour have elapsed. They are: precordial anxiety very much like the pain accompanying angina pectoris, filiform and extra-rapid pulse, lividity of the face, coldness in the extremities and abundant perspiration, rise in temperature, which may be as high as 40° C. (104° F.), irregular respiration—in some cases assuming the Cheyne-Stokes rhythm—disturbances of the digestive tract in the form of bilious vomiting, in certain cases coincident with diarrhea, diminution in the quantity of urine, and anuria, which in some cases has been observed twenty-four to forty-eight hours after the injections. The psychic disturbances are very marked and manifest themselves as excitement or loquacity; sometimes the patient weeps, or may exhibit intense anger. Tactile sensibility is blunted, especially in the hands, which become the seat of tingling sensations. Cases have been observed in which convulsions occurred—a cocainic symptomatic epilepsy—followed by a condition of motor and sensory paralysis lasting for several days. Fits of hysteria have also been known to result from the presence of cocain in the system. Death due to cocain poisoning supervenes at varied periods, in some cases two minutes after the administration of the alkaloid, in others at periods varying from a half hour to five hours. Ordinarily, however, the post-anesthetic accidents are not fatal, although they are the source of considerable discomfort, lasting several hours and in extreme cases several days. Post-mortem examinations show intense pulmonary congestion, occasionally the presence of numerous small infarcts, pulmonary edema, myocarditis and meningitis, although this latter disturbance is somewhat doubtful.

Regarding treatment, the author recommends to place the patient at once in the horizontal position, to give inhalations of amyl nitrite, and if further stimulation be necessary to resort to hypodermic injections of ether or caffein.

Chronic cocain poisoning occurs almost exclusively in those addicted to its use—cocainomaniacs. They develop such an intense degree of tolerance to the drug that many withstand daily doses of from 2 grams (30 grains) to 8 grams (120 grains). They exhibit tachycardia and intense psychic disturbances, eventually leading to a condition of complete mental and physical collapse.

[*Dental Office and Laboratory*, November, 1905.]

FLASKING AND PACKING RUBBER DENTURES. By Dr. H. S. Miller.

Instead of investing the teeth as by the method ordinarily employed, with the teeth

imbedded in the upper part of the flask and the cast of the mouth in the lower, the author reverses the plan and firmly invests both teeth and model in the lower part of the flask, cutting no gates in the anterior part of the mold and but slight gatage in the rear. The author claims that by this method if the articulation was correct before the investment there will be no chance for any change. In the old method, if for any reason the flask is not closed as it was when the investment was completed, it necessitates grinding the teeth in order to overcome the defect in closing the flask. To this factor the author attributes the frequent necessity of grinding the teeth after vulcanization. The method is as follows: Invest teeth in wax and the cast in the lower part of the flask, backing the teeth with plaster as thickly as possible. Bevel the plaster in order to separate the flask; varnish with separating fluid, placing the upper on the lower part of the flask; fill with plaster, separate the flask, remove the wax and pack the rubber. It is well to remove the varnish after separating the flask the first time to prevent the two parts sticking together after heating. If the lower part of the flask is not provided with holes to permit of the escape of the steam evolved during the heating of the flask incident to the packing of the rubber, a hole should be drilled through the plaster at the rear end of the flask, as otherwise there is a possibility of the plaster blowing out of the flask when heated over the flame.

[*Archives de Stomatologie et Journal de l'Anesthésie*, Paris, September 1905.]

DENTAL FISTULÆ. By Professor Paul Reclus of the Faculty of Medicine of Paris.

The author describes a case which came under his observation at the beginning of his surgical career. A man suffering from a facial fistula of long standing had been subjected to a series of surgical explorations, curettings, incisions, but all without avail. Finally a canine tooth was removed and inside of three days that which had resisted the action of strong caustics, the surgical knife, etc., healed without leaving the slightest trace of its previous existence.

The picture of this typical case remains in the author's mind as vivid today as at the time of its occurrence. Consequently when some time ago a woman patient presented herself at the hospital with a characteristic fistula of many years' standing upon the sterno-cleido-mastoid region the author at once referred the patient to a surgeon-dentist for the extraction of two diseased bicuspids on the same side of the face, and the patient recovered at once. This case is an interesting one in view of the fact that the disturbance had been diagnosed as a branchial abscess by several distinguished surgeons who intended to treat it by performing a delicate and dangerous operation in the vicinity of the carotid sheath. Dental or odontopathic fistulæ in some cases follow a rather extensive path, opening at points far removed from the seat of the primary infection. Thus many are the cases on record of fistulæ opening under the eye, in the temporal, occipital, and parotid regions, in the supra and infra-hyoid regions, in the sub-clavicular spaces, and even in the upper thoracic region. The author recalls a case in which the fistulous opening of an alveolar abscess upon a root fragment was located under the clavicle near the sternum. A physician diagnosed the case either as an osteitis of the clavicle or sternum or a sterno-clavicular arthritis.

The author's description of the pathology and usual clinical history of these conditions is here omitted, being matters of common knowledge among dental practitioners. His word of warning affects the general practitioner rather than the dentist, although it may nevertheless be well to state that cutaneous fistulæ originating in a focus of infection about a tooth-root may be confounded with chronic cellulitis, malignant tumors, and actinomycosis.

PERISCOPE.

To Preserve Rubber.—One part of ammonia in ten to twelve parts of water will preserve soft rubber. Dip rubber pipes, etc., in a glass jar filled with this solution. For the ammonia bottle use a rubber stopper; it is better than a glass one.—*Exchange.*

To Repair a Broken Tooth in a Gum Section.—Grind out the broken tooth from the section, even with the gingival margin, then select a plain vulcanite tooth of proper size and shade and grind to fit the space. Pack in fresh vulcanite around the pins of the tooth and vulcanize as an ordinary repair case. If a little care has been used in making the joint at the gingival line, the job cannot be detected from a full new block.—F. H. Wilkinson, *Dental Summary.*

The Flushing of Carious Cavities.—Before adjusting the rubber dam, clear the cavity of all overhanging edges, débris, and any softened portions of dentin, giving opportunity for frequent use of syringe, using tepid water to which has been added some good antiseptic or alkaline solution, thereby adding comfort and cleanliness to the operation. Absolute dryness, however, is always desirable in the final preparation and filling of the cavity.—Ralph W. Stewart, *Dental Review.*

Locating Foreign Bodies In the Throat.—In cases of foreign body in the throat never neglect to ask the patient, if sufficiently intelligent, to point with the finger to the site of the greatest pain and discomfort, as this affords a valuable clue to the position of the foreign body or of the abrasion inflicted. If situated above the pharyngeal constrictors the patient is apt to put his finger into the mouth, while if more deeply seated he will indicate some place on the outside of the throat. —*International Journal of Surgery.*

On the Manipulation of Cements.—In mixing cements, be quick and active. There is a tendency in the profession to mix cements too thick. Get away from that tendency; get away from it as far as possible. The kneading or working with the fingers of a mixture of dental cements prior to the introduction into a cavity is all wrong. Fill your cavity flush, and let it alone. Don't constantly disturb it till you cannot disturb it any more on account of the advanced stage of crystallization. If you agitate plaster of Paris while it sets it gets crumbly. Please apply this fact to dental cements. If you introduce dental cement in the right consistence it will exhibit a glossy surface when set. —D. Maurice Albrecht, *Dental Summary.*

Supporting a Sore Tooth while Drilling.—Instead of supporting a tooth by ligature to prevent pain while it is being drilled, take modeling compound, soften it and make a splint for both lingual and buccal sides of the teeth to support the sore tooth while drilling. This will prevent jarring and also prevent pressure on the inflamed peridental membrane.—T. L. Gilmer, *Dental Review.*

Every Dentist Should be His Own Prosthetist.—The dentist who is satisfied to go on indefinitely making vulcanite plates, knowing, as he must, that they are at best lacking characteristics which make the ideal, and without giving a thought to better subserving human interests by making use of materials which are physically adapted to the use—I am frank to say, has no right to be classed with scientific men, and a dentist who is satisfied to depend upon someone miles away to construct a plate or a crown, or a bridge, for his patient, with not the slightest consideration shown in its construction to individual conditions existing, and which should govern its construction, is, in my opinion, absolutely without right or license to be called either a skilled or scientific man.—R. C. Brophy, *Pacific Dental Gazette.*

Abutments of a Removable Bridge.—It is contended by some that the constant taking off and putting on of the bridge will cause the abutments to wear and become loose. This is not the case if the work has been done accurately in the first place. If a telescope crown be properly made and of a rigid material, there will be practically no wear on it and the bridge should be just as firm after years of use as when first put in the mouth. The fluids of the mouth form a coating which prevents the actual contact of the metals of the outer and inner caps, let them fit ever so closely. If the material of which the caps are made be so soft as to permit of their stretching in the slightest degree, allowing some

movement of the bridge on the abutments, it would impair its usefulness and render the piece worthless in a comparatively short time. —F. A. Peeso, *Dental Summary.*

Advantages of Removable Bridges.—That the fixed bridge has not a place I am not prepared to say, but that the removable bridge has a wider field, with greater possibilities and many advantages, I am thoroughly convinced. Enumerating some of the advantages of the removable over the fixed bridge, we have incomparably a more sanitary denture, greater possibilities of restoration of the lost tissues, whereby more natural and artistic results are obtained. Repairs are made simple and easy, and any subsequent repairs upon adjoining teeth are more simplified, and less destruction of natural teeth is required for abutments. Another advantage of no small importance is the fact that good, serviceable, as well as very artistic bridges, may be made with vulcanite base at a very moderate cost.—F. E. Roach, *Dental Review.*

Suggestions as to How to Avoid Failure in Vulcanite Work.—Use a good quality of plaster for both model and investment, and manipulate it so as to secure the greatest density with least expansion. Cut waste gates large enough to receive the excess of rubber and connect them with the peripheral margin of the matrix, but avoid the introduction of a large excess of rubber, using interposed muslin, and separate the case to determine the correct quantity. Heat the case gradually and uniformly, preferably by dry heat, and apply the pressure slowly, allowing ample time for the rubber to find its way into the waste gates, reheating the case if necessary. Place the flask above the water in the vulcanizer so that the vulcanization may take place in the steam and not under water. This prevents softening of the plaster.—J. H. Prothero, *Dental Review.*

Infected Third Molar Sockets.—After washing thoroughly, the socket may require curetting to insure the removal of any abnormal growth resulting from infection and inability of the tissues to heal normally. In case of continued pain camphorated oil gives relief in mild cases, but if extreme anodynes are necessary, one-eighth grain morphin may be taken, incorporated with balsam of Peru and iodoform (odorless), made into a paste and carried to the floor of the socket on a pledget of cotton and sealed with Fletcher's carbolized resin cotton, reducing the size of the dressing as the socket closes. In case of enlarged submaxillary and parotid glands, the use of one part tincture of opium and two parts lead-water form a happy application for the relief of pain; applied on flannel and wound with a hot cloth.—Jas. W. Winn, *Dental Headlight.*

Adaptation of Facings of Fixed Bridges to the Gum.—In fixed bridge work the facings should never press on the soft tissues, but should stand entirely away from them or touch them but lightly, so that the space can be freely flushed and the bristles of the brush can pass easily underneath them. If the facings are set in this way, they will never cause any irritation, provided they have been properly finished and polished. Every part of the bridge should be perfectly smooth and highly polished. The tips of the facings which have been ground to a sharp edge in shaping them to the gum surface should be nicely rounded and polished. There must be no unnecessary projections and no spaces which can serve as a lodging place for foreign matter. The whole bridge should be so constructed as to render every part of it accessible to the bristles of the brush in cleansing.—F. A. Peeso, *Dental Summary.*

Cement Fillings Overlapping at Margins.—I have always been very particular to finish a metal filling perfect with the contour of the tooth. With cement fillings I pursue the very opposite method. I desire the filling to lap over the entire margin of the cavity. This method has given very gratifying results. By this method, disintegration near the gingival border of the cavity on account of chemical decomposition I have found out to be less evident than reduction of size on account of attrition. Disintegration near the gingival border of the cavity used to be a source of aggravation a good many years ago. Once upon a time I fell upon the idea to permit my cement fillings to overlap and remain so, and the result was very satisfactory. Another satisfaction which I had was that the protruding and overlapping fillings never was productive of irritation or inflammation to the gums.—D. Maurice Albrecht, *Dental Summary.*

Scopolamin-Morphin as an Adjuvant in the Administration of General Anesthesia.—The author administers 1-100 grain scopolamin hydrobromid and ⅓ grain morphin hypodermically, half an hour before operating, using ethyl chlorid, followed by ether in small quantity, for the general anesthesia. He states that he can say without reserve that no results have been obtained by any other method which can be compared with those which this method has yielded. The

morphin lessens the susceptibility to shock, the scopolamin raises the blood pressure, and thus aids in preventing shock. The combination of the two drugs is, therefore, valuable from a prophylactic standpoint. The general anesthetic is taken after the administration of the scopolamin-morphin, without fear or excitement. Salivation is usually absent. The patient lies quietly after being replaced in bed, and awakens without excitement. The quantity of ether used by the author by this method is a little over two ounces an hour, the Bennett inhaler being used. In sixty-five cases in which the author had operated there was vomiting or retching on the operating table in only one. In 77 per cent. of the patients there was no vomiting at any time. In one-third of the cases there was one attack of vomiting, but there was only a small quantity of clear mucus, and the attack did not occur in any case in less than two hours after the operation.—SEELIG, *Annals of Surgery.*

Simple Method of Replacing Facing.—When a facing is lost from a Richmond crown or a bridge, and owing to a very thin backing or for other reasons, it is not practicable to secure a new one in place by the usual method of drilling holes in the backing, countersinking them on the reverse side and splitting the pins in the new facing. The following simple method will give satisfaction. Drill holes through the backing in the usual way to correspond with the pins of the facing you wish to attach. Then place the facing in position and with a sharp instrument nick each pin at the point where it emerges from the reverse side of the backing. Remove the facing and with a file cut each pin about one-third through at the place nicked. Then replace the facing, with or without cement as you prefer, and bend the pins down closely to the backing. This method is probably not original, but I have found it both easy of application and durable.—E. C. DURYEE, *Dental Summary.*

Saliva as a Therapeutic Agent.—Beyman in *Die Therapie der Gegenwart,* mentions four pathologic processes in which saliva is of decided benefit: 1. Throat affections, *e.g.* simple catarrhal tonsillitis, scarlatina, and diphtheritic affections. In these affections saliva acts as a hygienic and therapeutic agent. The former by keeping mucous membrane clean, the latter by moistening the inflamed areas. 2. Gastric hyperacidity: The alkaline saliva neutralizes the acids of the stomach. 3. Obesity: By removing liquids from the body the weight of the body can be reduced. The individual must chew some substance and expectorate the saliva. This method is less depressing to the circulation than is diaphoresis and reduces the appetite at the same time. 4. Edema and ascites: Leube demonstrated that through chewing and expectorating the saliva 400 to 1000 cubic centimeters of fluid can be removed in one day. He considers this method more efficient than using drugs to increase the saliva flow.—*Monthly Cyclopedia of Practical Medicine.*

Phenol-Camphor.—The mixture of equal parts of pure carbolic acid and gum camphor produces a clear, colorless, oily fluid, noncaustic, apparently non-irritating, miscible with alcohol but not with water, and possessing strongly the odors of its components. Chlumsky has been using the mixture of phenol and camphor for five years, in a wide variety of accessible surgical infections. Thus, he employed it freely as a surface dressing in erysipelas, lymphangitis, furunculosis, and after incisions of panaritia, phlegmons, pustules, etc. Abscess cavities and sinuses may be freely packed with gauze soaked in phenol-camphor. Chlumsky claims that suppuration is rapidly cut short, only a mucoid discharge remaining, and that there are no symptoms of poisoning.

It cannot truthfully be claimed that any one of the innumerable antiseptics recommended for the treatment of wounds, immediately and by its mere pressure stops suppuration, and our own limited experience with phenol-camphor would appear to indicate that it is probably no exception to the rule. Chlumsky's warm advocacy of its use, and his long experience with it, however, warrants an extended trial of the mixture.—*American Journal of Surgery.*

Choice of Impression Material and Manner of Manipulating the Tray.—As a general rule plaster of Paris is the material that will yield the best results, though a good modeling compound properly manipulated will sometimes be the best thing to use. The choice of the impression material must be largely a matter of individual judgment, as reference is had to peculiar cases. Not the least important part of impression-taking is proper finger manipulation of the material after the tray is in place. Carefully supporting the tray I instruct patients to press the tongue toward the sides and the front of the lingual tray edges, and that having been done I press the material toward the ridge on the buccal and labial edges with thumb and fingers. This procedure is especially important when modeling compound is used though it is my invariable custom, whatever be the impression material used. Then make a good hard model; fill in all the air-holes, even the most minute, and by using a proper varnish make the model smooth as glass. Don't use

it too soon; unless it is thoroughly set there will be a tendency to spread under pressure. When the patient returns, prepare the wax for the bite and be so thorough in getting it that there shall be no mal-articulation.—J. A. Hartman, *Dental Office and Laboratory.*

Aluminum a Substitute for Vulcanite?—Aluminum is the metal to which we seem now to be driven as the competitor of vulcanite in cost, and I believe that it is to aluminum that we must look for the eventual abandonment of the use of vulcanite in the making of base-plates. I believe that the use of aluminum swaged base-plates is infinitely more worthy of approval than is the use of the vulcanite base, for in this metal, as in all metals, the property of free conductivity is present. I am of the opinion that the trouble occasionally experienced of swaged aluminum plates being disintegrated by chemical action of the secretions is due to impurity of the metal. Too much of the plate supplied the profession is the ordinary plate of commerce, which is not refined as thoroughly as it might and should be. The fact of its being impossible to put rims for mechanical retention of the vulcanite attachment upon a swaged aluminum plate is a disadvantage. Here I would like to suggest that this objection may be overcome, if, in packing for vulcanization, a layer of weighted vulcanite is placed next to the metal. My experience has been that weighted vulcanite will not warp away from the metal. This applies also to the making of vulcanite attachments to gold. —R. C. Brophy, *Pacific Dental Gazette.*

Formation of Camphor.—H. Shirasawa, in the "Bulletin of the College of Agriculture of Tokio," vol. iii, gives an account of the formation of camphor in the leaves and stems of the tree. The oil cells appear very early under the vegetative point. In the young organs the oil cells contain an ethereal oil formed in the layer called by Tschirch the resinogenous layer, in which drops of the oil appear. In tropical regions the oil and the resinogenous mass in that layer are thicker than in the temperate climate of southern Europe. The oil exists in larger proportion in the old than in the young leaves. The transformation of the oil into camphor does not take place for some time after the formation of the oil. In young wood the oil is more frequently yellow than in the old wood, in which also crystals of camphor are more abundant. More colorless oil and crystals are formed in the parenchyma than in other tissues. The oil cells do not exist in the woody parts, fibro-vascular bundles, nor in the epidermis, and there are more cells in the secondary than in the primary bark, but they are more abundant in the wood parenchyma than in other tissues. In the young pith they are numerous, but diminish in number by age. The autumn wood contains more oil than that of spring.—*Monthly Cyclopedia of Practical Medicine.*

Trimming and Finishing a Lower Plate.—More than one lower denture has been laid upon the upper shelf of the pantry, or has been deposited within the depths of an old-fashioned sugar bowl, to await the resurrection of the just, because the plate was not properly finished. Most of the time the flanges, or rims, are left too long. They ride upon the tissues of the part of the mouth with which they come in contact, like a buoy at sea with the tide. In talking, the tongue displaces a plate like this, and in the act of mastication the buccinator muscles lift it up, and soon the movement, and the pressure upon it, cause the rims to cut their way into the soft parts, and an almost unbearable abrasion or sore results, so that the plate is removed and laid aside, in many cases never to be tried again, because "it don't fit." Some patients will endure this kind of annoyance for a while, and then return for relief, but most of them condemn the work and the worker in unmitigated terms, and refuse to be further tortured. All this can be avoided by trimming the plate, before dismissing the patient, so that the edges do not bear on the soft parts, and by having it rest squarely upon the ridge without impinging upon the muscles at the root of the tongue, or upon the attachments upon either buccal side. In many cases the muscular tissues and soft parts are raised when the tongue is raised, and extend above the ridge; this condition must be well looked to, so that the plate may be adjusted by proper trimming until it is not lifted out of place when in use. All the edges of the plate should be well rounded and smooth. On the buccal and lingual surfaces, concavities for the sides of the tongue and the folds of the cheek are found to materially assist in retention, and add to the comfort of the patient.—J. A. Hartman, *Dental Office and Laboratory.*

Silver Nitrate in the Treatment of Children's Teeth.—In case the child presents as a patient and no caries exists, the condition of the individual teeth should be carefully noted. If deep fissures and roughened surfaces are found, inviting decay, silver nitrate in a forty per cent. or stronger solution should be used liberally after the manner advocated by Dr. L. C. Bryan of Basle, Switzerland, which is practically as follows: Have the solution, made with distilled water, conveni-

ently at hand. Heat a few shreds of asbestos wool to a white heat to drive off all organic matter and felt them on platinum wire or an iridio-platinum broach. Isolate the tooth with the rubber dam. It is unnecessary to use clamps, ligatures, or rubber-dam holders. The deciduous teeth all have constricted necks, obviating the necessity for clamps or ligatures, and the rubber can be held out of the way with the fingers for the short time it needs to be in place. Paint the tooth-crown thoroughly with the solution applied by means of felted asbestos shreds. With a quill pick or an iridio-platinum broach work the liquid to the bottom of fissures. Let it dry on the tooth, if possible, but if the little one gets impatient take up all excess with bibulous paper or absorbent cotton and remove the rubber. If allowed to dry on the crown, remove the salts (which will have crystallized on evaporation of the water) with cotton or bibulous paper before removing the rubber. This treatment twice a year, with the ordinary daily cleansing by the patient or parent, is more than likely to absolutely inhibit caries in that mouth. The silver nitrate will not stain the enamel. It will stain organic matter on the enamel, but that may readily be removed with a little powdered pumice. The silver nitrate destroys all bacterial life and renders exposed dentin immune to caries for some months.—George Edwin Hunt, *Dental Summary.*

Too Much Delay Between the Extraction of the Teeth and the Insertion of the Plate.—Many dentists are advising patients to wait from three to six months for complete absorption of the alveolus, before taking the impression, and many patients think no harm can result if they supplement this advice by waiting a year or two. There is no greater cause for dissatisfaction than this unreasonable delay. In most cases absorption is rapid; the maxillary ridge is much reduced, and it gets into the habit of absorbing or of shrinking away, probably on account of the lack of use or exercise. Contour of the face and the natural expression are lost. The mandible reaches downward and forward in its efforts to touch something, thus stretching the muscles which normally hold the condyles in place, and causing a prognathous condition; the art of proper masticatory movement is lost and is most difficult to restore. When the plate is finally inserted, conditions are met which are very trying. The patient and all the cousins, sisters and aunts, accustomed to the appearance of the face as last seen, begin to criticize, and point out the strange, strained look about the mouth. The bite is uncertain and seldom in the same place, and the effort to learn to masticate food is usually the labor of weeks. To prevent all this, and thus avoid one pregnant cause of trouble, educate the people to have plates made immediately after extraction, that is to say, within a week. The maxilla is then nearly normal; a good ridge is present; there has been no change of facial expression to speak of; the muscles and integuments are all in place, and the bite is yet the same. The denture, if made immediately, will naturally fall into the place made vacant by the extraction of the teeth, and will not be an annoyance, because the mouth is no more crowded than it was before extraction. Let this first plate be worn from four to eight months, or as long as possible, then make it over. I meet with no serious objection on the score of the cost of the double operation, and have very pleasant results indeed. Someone has said that "temporary lower plates are the success of the permanent," and I find it so.—J. A. Hartman, *Dental Office and Laboratory.*

The Bactericidal Activity of Calcium Dioxid and of Hydrogen Dioxid.—At a meeting of the French Academie des Sciences, held on January 2d, Ed. Bonjean made a report on hydrogen dioxid in the nascent state and on its bactericidal effects upon the germs suspended in water.

The experiments of the author showed that 0.291 gm. of hydrogen dioxid is necessary to sterilize one liter of Seine water within six hours, and that under the same conditions 0.060 gm. of hydrogen dioxid will produce a complete sterilization within four hours if it acts in a nascent state, being liberated from calcium dioxid. The calcium of the dioxid has practically no bactericidal influence, as the reaction takes place in water overcharged with carbonic acid, which immediately transforms the calcium into a carbonate, which has no antiseptic properties.

The above experiments are of interest, as they show: First, that certain metallic peroxids have greater sterilizing efficiency than has hydrogen dioxid; second, and most important, that by the decomposition of peroxids the liberated oxygen in the nascent state combines first with any organic matter present in the water, and only in the absence of organic matter combines with water to form hydrogen dioxid.

The statement of M. Bonjean is liable to create a wrong impression. It is not hydrogen dioxid in a nascent state that sterilizes, but oxygen, the reaction taking place according to the following formula:

$$CaO_2 + CO_2 + H_2O = CaCO_3H_2O + O<$$

In my opinion this is the first reaction, and this reaction will continue as long as there is any organic matter in the water which can be oxidized. The first step is the decomposition of the calcium dioxid by the splitting off of oxygen in nascent form; the next step, if the reaction takes place in pure, sterile water, would certainly be the combination of the atom of O with water, forming H_2O_2. But so long as there is organic matter present the oxygen will not combine to form H_2O_2, but will act directly upon germs or other organic matter present.

It may be possible to find in these facts an explanation of the greater bactericidal effects shown by calcium dioxid than those shown by hydrogen dioxid.

Hydrogen dioxid mixed with water must be decomposed in order to do the sterilizing, being split into $H_2O + O<$. But according to M. Bonjean, hydrogen dioxid does the sterilizing, or by the act of combining O with H_2O the sterilization takes place.

It would be interesting to see precisely the reaction by which it could be shown that the formation of H_2O_2 could have any oxidizing effect. Its decomposition, of course, sets oxygen free, but the note of M. Bonjean conveys the idea that it is the formation and not the decomposition of hydrogen dioxid which exerts bactericidal power.—Richard von Foreger, Ph.D., New York.

A Crown for Bicuspids and Molars.—First: prepare the root as you would for a gold crown, having the root a little smaller at top than at margins; make a copper band about 1 inch long. Spread it at both ends so as to go between the adjoining teeth and fill with dental lac. Soften one end and place on end of prepared root; press lac against root; chill thoroughly, and pour plaster model. Take any molding ring and melt fusible metal, and when metal begins to thicken press impression of end of tooth into metal.

Take wire measure of root, then draw out on any of seamless outfits; take No. 30 platinum, make a seamless cap the diameter of the root, swaging it in the previously prepared mold.

Place cap on the root in the mouth and burnish well to margins of root; take iridioplatinum wire No. 14 and punch holes in cap; press pins in previously prepared canals; let pins extend above cap so as not to interfere with the occluding teeth; invest and solder with pure gold; place cap and pins in position in the mouth; take impression and pour model on crown articulator.

Now select a How dovetailed crown that approximately fits; if a little long, grind from lower end until the proper articulation is obtained. Remove cap with pins from the model so that it will come off easily; bend the pins in dovetail so as to lock them in the crown end, then tap in porcelain; dry and biscuit bake; try on in the mouth if convenient, —if not, on model. If everything be correct, build out the contour and fill flush with porcelain.—H. M. Davison, Hubbard City, Texas.

Evil Effects of Carbolic Acid when Locally Applied.—We have more than once called attention to the disastrous effects which sometimes follow the prolonged application of weak solutions of carbolic acid to the fingers and toes. Some years ago Harrington called special attention to this matter, and pointed out that even such weak solutions as two-per-cent. carbolic acid in water, if bound around a finger or a toe, might result in gangrene of the part, whereas very much stronger solutions might be kept in contact with the skin of other portions of the body for long periods of time without deleterious results. When a finger or toe has been subjected to traumatism, and thereby has its vitality diminished, it is by no means an unusual thing to find that it has been dressed with cloths dipped in weak carbolic acid solution, and the very diminution in vitality produced by the injury greatly increases the tendency to gangrenous change.

Our attention has been called to this subject again by an article published by Cotte in *La Presse Médicale* of July 5, 1905. To the condition he gives the name "gangrène phénique" and reports a case of a domestic of eighteen years who suffered from gangrene of the right middle finger after applying a weak solution of carbolic acid for several days under the direction of a druggist. The application of the carbolic acid diminished the pain and produced anesthesia, but ultimately it caused the gangrenous change. The finger when examined was quite black, and there is no doubt in the opinion of Cotte that the carbolic acid lotion was responsible for its condition. The necrosis was complete and the gangrene was of the dry type.

Cotte points out that the number of cases of this character which have been reported is now quite numerous. Many years ago Lister insisted upon the danger of these dressings, particularly in children, and Tillaux and Poncet have reported other instances of the same character as long ago as 1872. In 1882 Brun, and in 1893 Bardet, also made communications upon this subject, which was also discussed in 1889 and 1894 by the Paris Society of Surgery. Investigations on this sub-

ject have also been made in Germany by Leusser in 1890, Kortum in 1891, Czerny in 1898, Frankenberger in 1898, and Fisher in 1901. It is a noteworthy fact that all of these reporters have insisted upon the serious character of carbolic acid gangrene. After insignificant injury to a finger it is treated with a carbolic acid solution in water, and then a varying length of time afterward the gangrenous change takes place; the part becomes yellow, brown, then brownish-black, and finally perfectly black. It is insensitive and mummified. A sharp line of demarkation usually develops at the end of two or three weeks without any elevation of temperature, and the necrotic part separates with an irregular line of separation.

The theories as to the causation of this change are various. Kortum believes that the influence is produced by an action of the drug upon the peripheral cutaneous nerves, or in other words, that the gangrene is the result of a trophoneurosis. Frankenberger, on the other hand, believes that it is due to an influence upon the circulation of the part whereby constriction and thrombosis of the vessels occur; while others, amongst them Harrington, believe that the change takes place in both the nerves and vessels, and in addition that the acid causes coagulation of the albumin in the parts.

Whatever may be the actual pathogenesis of the condition, there can be no doubt that it occurs, and physicians will do well to bear in mind the possibility of the development of this untoward effect of what appears at first sight to be a useful but harmless surgical application.—*Therapeutic Gazette.*

HINTS, QUERIES, AND COMMENTS.

SUBMARINE GOLD.

Moss fiber gold prepared by the following method can be packed into a cavity in the mouth almost as easily as amalgam:

Cut the gold with a sharp scissors into squares proportionate to the size of the cavity. With a fine platinum point pick up the gold, a piece at a time, and heat over a Bunsen burner or alcohol lamp to a cherry red, and plunge quickly into absolute alcohol, then drop into pure water. Use the gold direct from the water. The first piece of gold used should be larger than the floor of the cavity and should be seated with a broad oval-faced plugger and well condensed. After that use smaller pieces with oval-faced pluggers, going over each piece with a fine-pointed plugger, with mallet force. Any amount of gold may be prepared and allowed to remain in the water until used. Do not take the gold out of the water and allow it to dry. Gold that was prepared in the above manner and kept under water for six months now works perfectly.

This method of working gold causes a great saving of time and nerves for both patient and operator, especially in those cervical cavities that extend deeply under the gums, where the application of the dam is both tedious and painful. The cavity, during the process of filling, may be flooded with tepid water as often as is necessary to keep it practically free from saliva.

W. F. Johnson.

Bangor, Me.

ARTIFICIAL TEETH IN THE TIME OF HEROD.

In Edersheim's "Life and Times of Jesus the Messiah," vol. i, page 131, in writing of the things purchasable in Jerusalem during the reign of Herod the Great, which occurred B.C. 40-4, we have these astonishing words: "And then the lady visitor might get anything in Jerusalem, from a *false tooth* to an Arabian veil, a Persian shawl, or an Indian dress." Evidently that author knew what he was writing about, and I hardly think he made a mistake in naming the articles that could be purchased in Jerusalem at that time. If someone can give us some authentic dental history that will cover that period, I fancy it would furnish interesting reading matter.

Walter C. Miller.

Augusta, Ga.

OBITUARY.

R. ALLISON MILLER, D.D.S.

DIED, at Huntingdon, Pa., October 24, 1905, in the seventy-sixth year of his age, from pneumonia, Dr. R. ALLISON MILLER.

Dr. Miller's health for the past three years had, at times, been critical, due to a derangement of the heart. He was the son of Benjamin and Elizabeth Allison Miller. He received his education at Huntingdon, and after finishing his course of study, engaged in teaching school for about a year. He afterward studied dentistry in the office of Dr. H. K. Neff of Huntingdon, and completed his professional preparation in the old Philadelphia College of Dental Surgery, from which he was graduated in 1853. He commenced the practice of his profession in Huntingdon and continued with remarkable success for twenty-six years. Relinquishing dentistry in 1876 he devoted his whole time to the real estate and insurance business, having been general agent of the Penn Mutual Life Insurance Company of Philadelphia since 1853. He continued in this position until the time of his death. He was also engaged for a time in the flour milling business with the late Hon. Horatio G. Fisher, under the firm name of Fisher & Miller.

Dr. Miller was an active Mason, being a member of Mount Moriah Lodge, No. 300, and Standing Stone Chapter of Royal Arch Masons, No. 201. He was a past master of the lodge and was also a member and past commander of Huntingdon Commandery, No. 65, Knights Templar. He was a member of the Presbyterian Church and for a number of years was president of its board of trustees.

He was married May 17, 1853, to Mary Lyon (daughter of Thomas and Rachel Jackson Fisher) who together with six children—four sons and two daughters—survives him.

The death of Dr. Miller removes one more of those early dental pioneers who in the formative days of the profession did such noble work in rescuing dentistry from charlatanism and helping to place it upon a secure foundation of systematic education and sound professional ethical sentiment. His teachers were a broad-minded group of men, with lofty ideals: Elisha Townsend, Eli Parry, Robert Arthur, Thomas L. Buckingham, John DeHaven White, and others of less professional prominence, constituting the faculty of the old Philadelphia College of Dental Surgery. It was from this body of teachers under the able directorship of Elisha Townsend that Dr. Miller certainly imbibed the impulse of those ethical and professional features which later became the characteristics of his career. That it was seed sown upon fertile soil is manifest by reason of the evident inherent tendencies of the man himself, yet the effect of his training under these high-minded early teachers of dentistry cannot be ignored in computing the sum total of influences which formed the life and character of Dr. R. Allison Miller. The life of service, of usefulness to humanity, of probity and purity which characterized all of his activities are features which have been singularly prominent in the careers of by far the larger number of men who received their first instructions in dentistry from the faculty of the pioneer dental college in Philadelphia, and this aspect of their educational work will always stand as a model for imitation, if not attainment, by their successors.

DR. FREDERIC FRANK DURAND.

DIED, at his residence in Maplewood, N. J., October 29, 1905, in the sixty-seventh year of his age, Dr. FREDERIC FRANK DURAND.

In the sudden death of Dr. Durand the dental profession has lost another of those older practitioners whose ranks are rapidly diminishing. He had recently returned from his summer home at Lake George, N. Y., apparently in the best of health, and the announcement of his sudden demise was a sad surprise to his many friends. Without warning, he was stricken with heart trouble, and, while conversing with his wife, succumbed immediately.

Dr. Durand was born in New York sixty-six years ago. He was a son of the distinguished artist, Asher B. Durand. Educated in private schools in New York city, and in the preparatory school at Lee, Mass., he afterward took the scientific course in civil engineering and architecture at Rensselaer Polytechnic Institute, in Troy. The Civil War then coming on and the resulting inactivity of business caused him to decide to enter the dental profession. Dr. Edwin James Dunning, a personal friend of his father's, and one of the leading dentists of that day, persuaded young Durand to enter as a student in his office, which at that time was known as the "Dunning School of Dentistry." In addition to the facilities afforded under Dr. Dunning's teaching, he took a course in anatomy and materia medica in the College of Physicians and Surgeons, New York. He completed his dental education in the Baltimore College of Dental Surgery, graduating in 1863. He remained associated with Dr. Dunning until the latter retired from practice in 1874, when with Dr. George Elias Hawes—also an associate of Dr. Dunning's—he formed a partnership under the firm name of Durand & Hawes, in 1856, to continue the practice established by Dr. Dunning at No. 11 Waverly Place. Upon Dr. Hawes' death in 1880, Dr. John B. Hawes, his brother, entered the partnership. Owing to business encroachment in the lower Fifth avenue residential section, Durand and Hawes were compelled to leave the house in Waverly Place in which Dr. Dunning had established his practice twenty-five years before, and to locate at No. 13 West Thirty-second street, where they remained until 1894, when conditions again required their removing—to No. 20 West Forty-seventh street.

With the death of Dr. Durand there terminated a partnership of over thirty years' standing, and including the Dunning School, an established practice of half a century.

Dr. Durand was in active practice over forty years and had devoted his life to the professional training of young men who have been associated with him. He was a worthy teacher of his predecessor's system, and a large number of dental practitioners who came in close contact with him will cherish the memory of his valued friendship and teaching. Although in his sixty-seventh year, he continued in practice, traveling daily between his country home and New York.

Outside of his profession Dr. Durand was very much interested in art. He was one of the founders of the American Water Color Society, and devoted much of his vacation time to art work, mostly landscapes. He was also greatly interested in the welfare of his home community, where he had spent most of his life; the landed property he inherited had been in his father's family upward of one hundred and thirty years. He was an active member of the Maplewood Improvement Association, and chairman of the board of governors of its Public Building Company.

Dr. Durand was married in 1903 to Miss Helen Thompson, of Louisville, Kentucky, who survives him. He leaves also a brother, Prof. John Durand of Paris, and one sister, Mrs. George B. Woodman of New York.

JOSEPH C. HANCE.

Died, at his country home, Weldon, Montgomery Co., Pa., Monday, November 13, 1905, from paralysis, Joseph C. Hance.

Mr. Hance died ten days after being stricken by paralysis, from which he never regained full consciousness. He was a member of the old firm of Hance Brothers & White, pharmaceutical chemists of Philadelphia. When a young man he joined his brother in the business, and always commanded the esteem of the correspondents of the house. He was a man of retiring disposition, whose general condition of health prevented him from taking part in public affairs, although earnestly interested in all that promised the good of the community. A man of generous impulses, he endeared himself to all who came to know him intimately.

For a number of years he was a director of the Consolidation National Bank, a member of the Art Club, Pennsylvania Historical Society, Franklin Institute, Manufacturers' Club, and Huntingdon Valley Country Club. He is survived by a widow and one daughter, wife of Professor Blake of Lehigh University. The funeral took place from his Weldon home.

DENTAL LEGISLATION.

DENTAL LAW FOR JAMAICA.

[LAW 11 OF 1905.—THE DENTAL PRACTITIONERS LAW, April 27, 1905.]

WHEREAS it is expedient to make provision for the registration of persons practicing dentistry in Jamaica.

Be it enacted by the Governor and Legislative Council of Jamaica, as follows:

SECTION 1. The office of the registrar general of births and deaths shall be the registry of qualified dental practitioners, and the registrar general of births and deaths shall be the registrar under this law.

SEC. 2. The registrar shall, on the first day of October 1905, open and thereafter keep, as nearly as may be according to the form in the schedule to this law, a register of qualified dental practitioners.

SEC. 3. A copy of the register shall be published by the registrar in the *Gazette* within three months after the first day of October 1905, and thereafter a copy of the register, as it stands at any such time, shall be published by the registrar in the first *Gazette* issued after every succeeding first day of May and November.

Any copy of the *Gazette* containing the most recent copy of the register, shall be *prima facie* evidence in all legal proceedings that the persons therein specified are registered under this law; and, the absence of the name of any person from such copy, shall be *prima facie* evidence that such person is not registered under this law.

SEC. 4. Every person registered under this law shall be entitled to practice dentistry in this Island, and to demand and recover reasonable charges for dental aid rendered by such person, and the cost of dental medicines and appliances supplied by him.

SEC. 5. No person not registered under this law, shall be entitled to recover in any action any charge for any dental aid, advice, attendance, or visit.

SEC. 6. The following persons, upon satisfying the registrar by such documentary or other evidence of their right to be registered, and upon payment of a registration fee of one guinea, shall be entitled to be registered under this law. (*a*) Any person qualified or entitled to practice dentistry in the United Kingdom under any act for the time being in force. (*b*) Any person who, at the passing of this law, is *bona fide* engaged in the practice of dentistry in this Island, and who holds a diploma, license, or certificate granted to him by any university, college, or institution recognized by the governor in privy council, after and in consequence of his having passed through the course of study and examination in dentistry, prescribed by such university, college, or institution. (*c*) Any person who at the passing of this law is and has been for not less than three years *bona fide* engaged in the practice of dentistry in this Island, and whom the governor in privy council for special cause shown, permits to be registered without examination.

SEC. 7. The registrar shall erase from the register any entry which has been incorrectly or fraudulently made, and shall erase the name of any person who shall die, or who has given notice that he has ceased to practice.

The registrar shall also, provided he first obtains the sanction of the governor, erase the name of any person convicted of felony, or misdemeanor, either before or after the passing of this law, and either before or after registration.

SEC. 8. Any person who at the passing of this law, is *bona fide* engaged in the practice of dentistry in this Island; and also any person not qualified to be registered under Section 6 of this law, but who holds a diploma, license, or certificate granted to him by any university, college, or institution recognized by the governor in privy council, after and in consequence of his having passed through the course of study and examination in dentistry prescribed by such university, college, or institution, and who wishes to be registered under this law, may make application in writing to the governor to appoint a board of examiners.

Sec. 9. On receipt of such application the governor shall appoint three persons, duly registered under this law, as a board of examiners, and the persons so appointed shall thereupon fix a time and place for holding the examination.

Sec. 10. The candidate shall first satisfy the board of examiners that he was at the date of the passing of this law *bona fide* engaged in the practice of dentistry in this Island, or that he holds a diploma, license, or certificate granted to him as aforesaid, and the board of examiners, if so satisfied, shall with reasonable dispatch fully and fairly examine such candidate accordingly; and if they find him sufficiently informed and skilled, they shall give him a certificate to that effect, and he shall then be entitled to be registered under this law, upon payment of the registration fee.

Sec. 11. The governor shall appoint some fit and proper person to act as secretary to such board, and shall pay to each examiner for each examination, a fee of one guinea, and to the secretary a fee of one guinea.

Sec. 12. Any candidate who presents himself for examination shall be required to deposit with the secretary, before the examination, the sum of five guineas, to be applied in payment of the fees mentioned in the preceding sections, and which shall not in any case be returned to the candidate.

Sec. 13. Any person (*a*) Who shall fraudulently procure or attempt to procure himself or any other person to be registered under this law, or shall aid or abet in such fraudulent procurement or attempt, or (*b*) Who, not being registered under this law, shall hold himself out or pretend to be, or use or take the name or title of Dentist, or Doctor of Dental Surgery, or any name, title, or addition implying such qualification, or that he is a person specially qualified to practice dentistry, shall be guilty of an offense under this law, and shall on conviction be liable to a penalty not exceeding twenty pounds, or to be imprisoned, with or without hard labor, for any term not exceeding six months.

Provided always, that a person shall not be guilty of any offence under clause *b* hereof, if he shows that he holds a qualification which entitles him to practice dentistry, or dental surgery in the United Kingdom, a British possession, or foreign country, and that he did not represent himself to be registered under this law, or if he shows that he has been registered and continues to be entitled to be registered under this law, but that his name has been erased on the ground only that he has ceased to practice.

Sec. 14. Any registrar or other person who knowingly shall fraudulently make, or cause, or permit to be made, any false or incorrect entry in the register, or any copy thereof, shall on conviction be liable to imprisonment, with or without hard labor, for a term not exceeding two years.

Sec. 15. A prosecution for any offense under this law, shall not be instituted without the sanction of the attorney general.

Sec. 16. Any person registered under this law shall, if he so desires, be exempt from service on juries or in the militia.

Sec. 17. Nothing in this law contained shall extend to prejudice or in any way affect duly registered medical practitioners.

[A schedule follows, having columns for names, addresses, dates of qualification or examination, and dates of registration.]

SOCIETY NOTES AND ANNOUNCEMENTS.

INSTITUTE OF DENTAL PEDAGOGICS.

THE annual meeting of the Institute of Dental Pedagogics will be held in the Fifth Avenue Hotel, New York, December 28, 29, and 30, 1905. The following subjects will be discussed: Anesthesia, extraction, operative and prosthetic technics, crown and bridge work, orthodontia, porcelain technics, chemistry, anatomy, and oral surgery, teaching in the infirmary.

The main discussion will be "How should these subjects be presented to a dental student?" This will be the most important dental meeting of the year, especially for teachers. As far as possible, all demonstrators as well as professors, should make an effort to be present.

W. E. WILLMOTT, *Sec'y*,
Toronto, Ont.

OHIO STATE DENTAL SOCIETY.

THE fortieth annual meeting of the Ohio State Dental Society will be held in the Great Southern Hotel, Columbus, Ohio, December 5, 6, and 7, 1905. An exceptionally strong program of papers and clinics has been provided, and we have every assurance of a highly successful meeting.

F. R. CHAPMAN, *Sec'y*,
305 Schultz bldg., Columbus, O.

SECOND DISTRICT (N. Y.) DENTAL SOCIETY.

THE Second District Dental Society of the State of New York will hold a regular meeting on Monday evening, January 8, 1906, at the King's County Medical Library Building, 1313 Bedford ave., Brooklyn, N. Y.

An exhaustive paper will be read by Joseph William Wassall, M.D., D.D.S., of Chicago, Ill., on "Gold Inlay Restoration of Bicuspids and Molars." This will be a most valuable meeting, as the paper to be read is one of great interest at the present time, and will be discussed by prominent men of the profession.

The following dental societies have been officially invited: First District (N.Y.) Dental Society, New York Odontological Society, Central Dental Association of Northern New Jersey, New York Institute of Stomatology, and the New York Institute of Dental Technique.

A most cordial invitation is extended to all ethical members of the dental profession. A collation will be served at the close of the discussion.

LEROY S. EDWARDS, *Cor. Sec'y*,
140 Remsen st., Brooklyn, N. Y.

NORTHWESTERN UNIVERSITY DENTAL SCHOOL.

ALUMNI ASSOCIATION—ANNUAL CLINIC.

THE Alumni Association of Northwestern University Dental School will hold its annual clinic on Tuesday, January 16, 1906, at the University Building, corner of Lake and Dearborn streets, Chicago, Ill.

All practitioners are invited to attend.

FRED W. PARKER, *President*.
G. B. MACFARLANE, *Sec'y*,
70 State st., Chicago, Ill.

AMERICAN SOCIETY OF ORTHODONTISTS.

AT the fifth annual meeting of the American Society of Orthodontists, held in Chicago, September 28 to 30, 1905, the election of officers was announced, as follows: Dr. R. Ottolengui, New York, N. Y., president; Dr. Herbert A. Pullen, Buffalo, N. Y., vice-president; Dr. F. S. McKay, St. Louis, Mo., secretary-treasurer; Dr. Milton T. Watson, Detroit, Mich., member of the Board of Censors.

F. S. MCKAY, *Sec'y*,
St. Louis, Mo.

CHICAGO COLLEGE OF DENTAL SURGERY.

ELEVENTH ANNUAL CLINIC.

THE eleventh annual clinic of the Chicago College of Dental Surgery will be held at the College Building, Chicago, January 17 and 18, 1906. This meeting will be a reunion of graduates of the college regardless of whether they are members of the alumni or not.

A very excellent program is being arranged, consisting of papers with discussions, a clinic, and a banquet.

Rates on all railroads, one-third fare on the certificate plan, have been arranged for.

RUDOLPH BECK, *President.*

G. V. BLACK DENTAL CLUB.

THE G. V. Black Dental Club (Inc.) of St. Paul, Minn., will hold a mid-winter clinic in St. Paul, Minn., February 22 and 23, 1906.

All practitioners are most cordially invited to be present. An interesting program is being arranged.

For further information address,

107 E. 6th st., St. Paul, Minn.

R. B. WILSON, *Sec'y.*

NEW HAMPSHIRE DENTAL SOCIETY.

THE twenty-ninth annual session of the New Hampshire Dental Society will be held at the Pemigewassett House, Plymouth, N. H., (Gateway to the White Mountains) May 8 and 9, 1906.

F. F. FISHER, *Sec'y,*
Elm st., Manchester, N. H.

PENNSYLVANIA STATE DENTAL SOCIETY.

AT the thirty-seventh annual meeting of the Pennsylvania State Dental Society, held in Philadelphia, June 27 to 29, 1905, the following officers were elected for the year 1905-1906: H. W. Arthur, president, Pittsburg; J. T. Lippincott, first vice-president, Philadelphia; W. A. Spencer, second vice-president, Carbondale; Luther M. Weaver, recording secretary, Philadelphia; V. S. Jones, corresponding secretary, Bethlehem; R. H. D. Swing, treasurer, Philadelphia; H. M. Beck, G. L. S. Jameson, H. S. Seip, council (for one year); H. C. Register, J. T. Lippincott, F. D. Gardiner (for two years); J. A. Libbey, H. B. McFadden, H. N. Young (for three years); W. D. DeLong, A. N. Gaylord, C. C. Taggert, C. C. Walker, H. E. Freisell, board of censors. H. B. McFadden, H. S. Seip, J. P. Nichol, executive committee. F. D. Gardiner, C. B. Bratt, A. S. Koser, J. T. Lippincott, G. L. S. Jameson, legislative committee. F. D. Gardiner, George F. Root, H. Zimmerman, H. W. Bohn, D. C. Dunn, S. M. Stauffer, J. E. Habbeger, C. S. Beck, C. H. McCowan, B. F. Witmer, C. C. Walker, committee on enforcement of dental law. A. N. Gaylord, O. G. L. Lewis, W. Clay Middaugh, clinic committee. S. P. Cameron, G. H. Jackson, C. B. Bratt, exhibit committee. Luther M. Weaver, I. Norman Broomell, Otto E. Inglis, publication committee. W. F. Litch, H. C. Register, J. A. Libbey, committee on ethics. H. N. Young, M. I. Schamberg, H. Ralston Swing, H. C. Register, committee on oral hygiene and public school dental education.

Note—The first named on each committee is its chairman.

V. S. JONES, *Cor. Sec'y,*
Bethlehem, Pa.

HARTFORD DENTAL SOCIETY.

THE Hartford Dental Society held their annual meeting October 9, 1905, when the following officers were elected: A. E. Cary, president; E. R. Whitford, vice-president; Edwin H. Munger, secretary; A. A. Hunt, treasurer; J. H. Kane, librarian. Executive committee—H. E. Snow, Nelson Goodwin, and C. H. Riggs.

EDWIN H. MUNGER, *Sec'y,*
Hartford, Conn.

IOWA BOARD OF DENTAL EXAMINERS.

THE Iowa State Board of Dental Examiners will hold its next meeting for examination of candidates in the Capitol building, Des Moines, Iowa, December 12 and 13, 1905, beginning at 9 A. M.

For application blanks and all information apply to

E. D. BROWER, *Sec'y,*
Le Mars, Iowa.

PENNSYLVANIA BOARD OF DENTAL EXAMINERS.

THE Board of Dental Examiners of Pennsylvania will conduct examinations simultaneously in Philadelphia and Pittsburg, December 12 to 15, 1905.

For papers and cards of admission address

N. C. SCHAEFFER, *Sec'y Dental Council,*
Harrisburg, Pa.

NEW HAMPSHIRE BOARD OF REGISTRATION.

THE New Hampshire Board of Registration in Dentistry will hold their next examination of candidates for registration December 12, 13 and 14, 1905, at Manchester House, Manchester, N. H.

A. J. SAWYER, *Sec'y,*
Manchester, N. H.

ARIZONA BOARD OF DENTAL EXAMINERS

THE next meeting of the Arizona Board of Dental Examiners for examination of applicants will be held in Phœnix, Ariz., December 27, 28, and 29, 1905. Examination fee $25.00. Make application to

W. P. SIMS, *Sec'y,*
Bisbee, Ariz.

INDIANA BOARD OF DENTAL EXAMINERS.

THE Indiana State Board of Dental Examiners will hold their next regular meeting at Ft. Wayne, Ind., January 9, 10, and 11, 1906, in the office of Dr. J. S. McCurdy. All applications for examination must be filed with the secretary not later than January 4th.

For further information apply to

F. R. HENSHAW, *Sec'y,*
Middletown, Ind.

SOUTH DAKOTA BOARD OF DENTAL EXAMINERS.

THE next meeting of the South Dakota State Board of Dental Examiners will be held at Sioux Falls, S. D., January 16, 1906, beginning at 1.30 P. M. All applicants for examination must bring diplomas from reputable dental colleges or affidavit of having been engaged in the practice of dentistry for at least three years immediately preceding said examination. Instruments and materials necessary to do all kinds of operative and prosthetic work will be needed at this examination. Vulcanizer and lathe will be furnished by the Board.

All applications must positively be in the hands of the secretary by January 9th.

G. W. COLLINS, *Sec'y,*
Vermillion, S. D.

MICHIGAN BOARD OF EXAMINERS.

AT the last regular meeting of the Michigan State Board of Examiners in Dentistry, the following officers were elected to serve for the ensuing year: Walter C. McKinney, Saginaw, president; Chas. H. Oakman, Detroit, treasurer; Albert L. LeGro, Three Rivers, secretary.

Reciprocity with Oklahoma was ratified. Michigan now interchanges licenses with Canadian Northwestern Territories, New Jersey and Oklahoma.

ALBERT L. LEGRO, *Sec'y,*
Three Rivers, Mich.

NEW JERSEY BOARD OF EXAMINERS.

THE New Jersey State Board of Registration and Examination in Dentistry will hold its semi-annual meeting in the theoretical branches in the Assembly chamber of Statehouse, Trenton, N. J., December 12, 13, and 14, 1905. Sessions begin promptly at 9 A. M. each day.

Practical operative work at the office of the examiner in practical operative work, Dr. C. S. Stockton, 22 Central ave., Newark, N. J. Practical prosthetic work at the office of Dr. A. Irwin, 425 Cooper st., Camden, N. J. All practical work appointments secured from the examiners of those branches.

Application must be in the hands of the secretary two weeks prior to the examination.

CHARLES A. MEEKER, *Sec'y,*
29 Fulton st., Newark, N. J.

ARMY DENTAL CORPS.

Dental Surgeon S. Davis Boak, U.S.A., is relieved from duty at Fort Myer, Va., and will proceed to Columbus Barracks, Ohio, for duty. (Nov. 13, W.D.)

Par. 1, S.O. 60, c.s., these headquarters, is amended so as to direct Contract Dental Surg. George L. Mason to proceed to Fort Dade, Fla., for duty. (Oct. 31, D.G.)

Dental Surgeon John D. Millikin is relieved from duty in the Philippines Division, and will proceed on the transport to sail from Manila about December 15, 1905, to San Francisco, Cal. (Nov. 24, W.D.)

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING OCTOBER 1905.

October 3.

No. 800,669, to Benoni Nowland. Chair back.

No. 800,981, to James W. Buchanan. Air-blast attachment for dental engines.

No. 801,056, to Fredric E. Andersen. Dental matrix.

October 10.

No. 801,215, to Franklin O. Cates. Dental engine attachment.

No. 801,219, to John W. Cooper. Flushing cuspidor.

No. 801,220, to John W. Cooper. Flushing cuspidor.

No. 801,221, to John W. Cooper. Cuspidor.

No. 801,351, to James H. Abbott. Bristle brush.

October 17.

No. 801,841, to Joseph B. Besant. Mouth-prop.

No. 801,911, to Carl Rauhe. Artificial teeth.

No. 802,099, to Eustace H. Gane. Dentifrice.

No. 802,339, to August de Trey. Inhaler.

October 24.

No. 802,408, to William A. Rowe. Cervix clamp for use in dentistry.

No. 802,483, to Bert G. Simmons. Dental appliance.

No. 802,683, to John R. Comins. Dental swage.

October 31.

No. 802,989, to Albert P. Johnstone. Dental instrument.

No. 803,045, to Lisle H. Babcock. Dentist's cervical clamp.

No. 803,198, to Richard A. Sparke. Saliva absorbing roll holder and shield.

No. 803,474, to James W. Dennis. Dental applicator.

No. 803,475, to James W. Dennis. Dental applicator.

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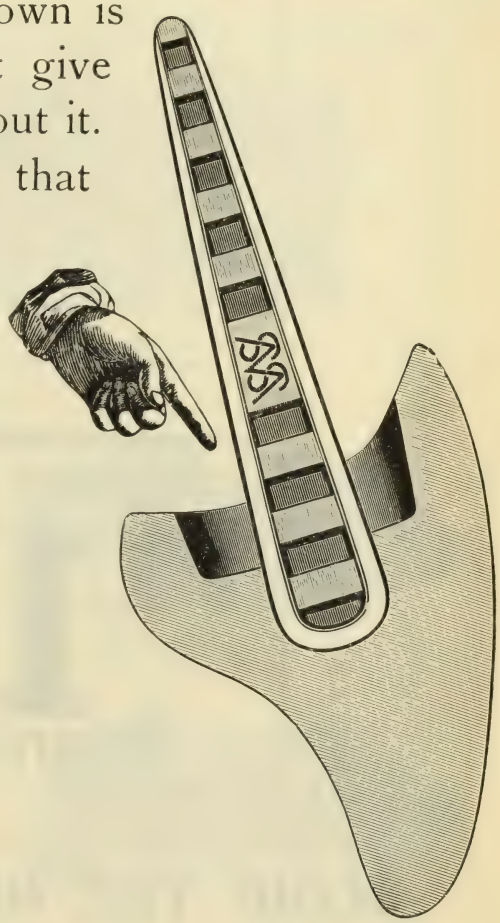
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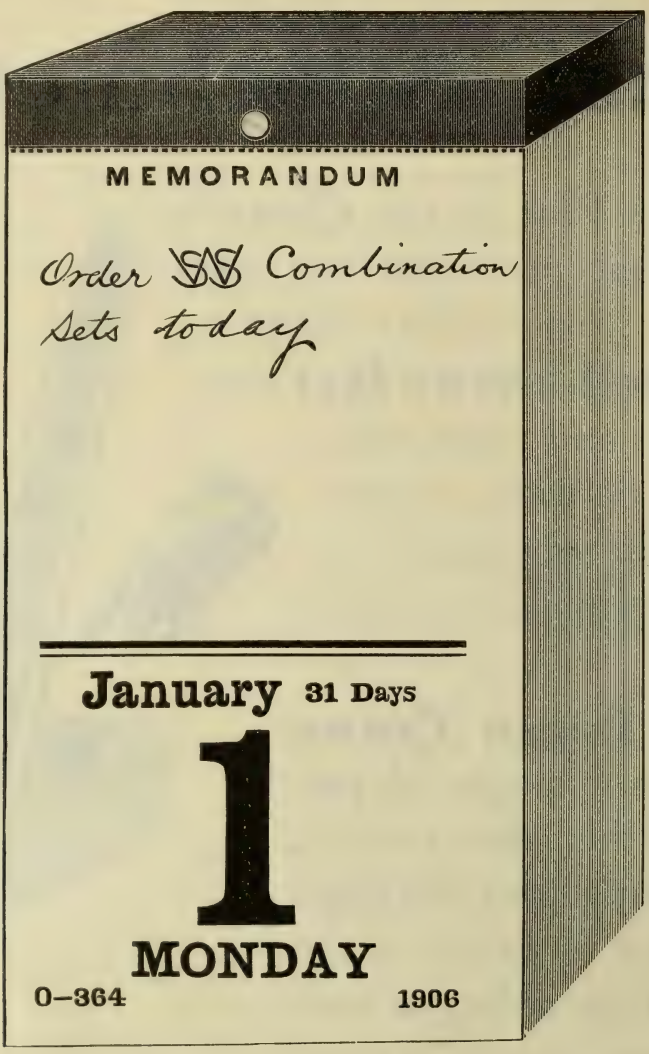
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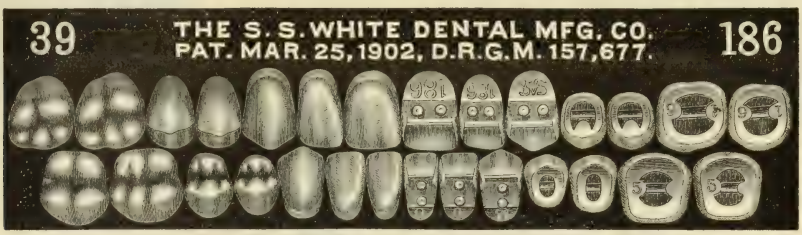
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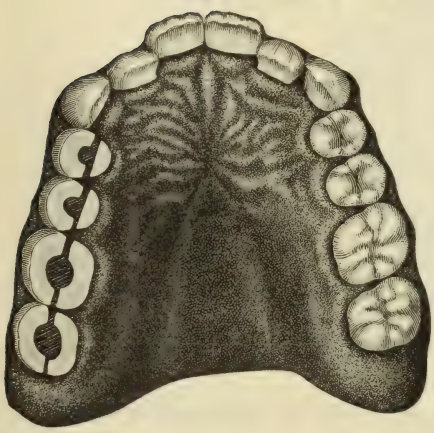
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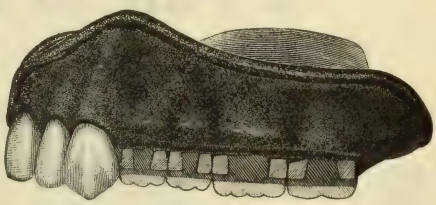
"Combination" Sets



"Combination" Set of 28, Uppers and Lowers. Showing the blend of pinless and pin teeth and the means of attachment to the vulcanite



The Vulcanite in the Molars and Bicuspids is continuous with the Vulcanite of the Base-plate



The Clinching of the Vulcanite in the Molars and Bicuspids



The Blend in the Completed Denture

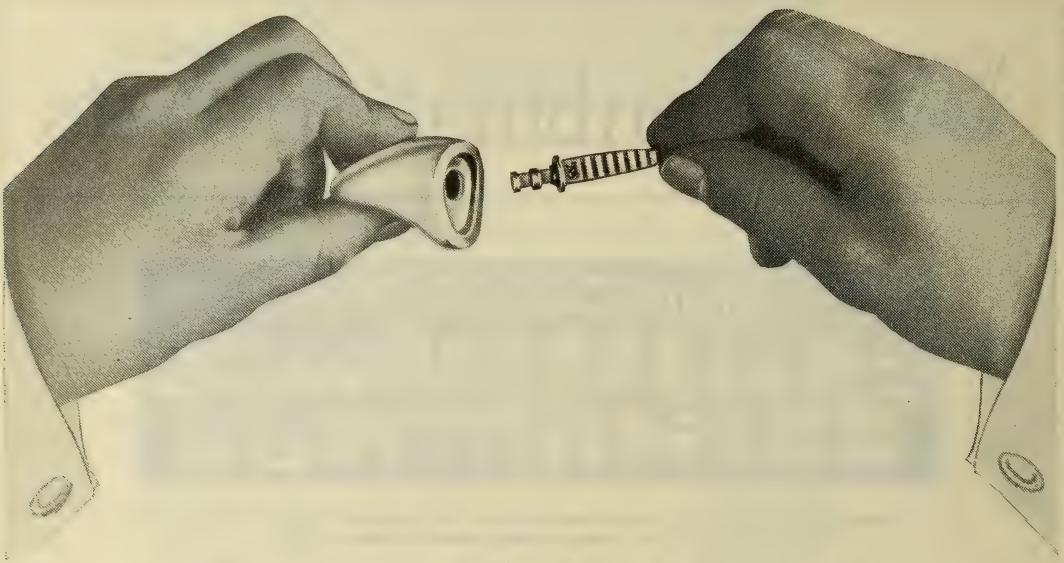
Porcelain and Vulcanite are so dovetailed into each other that they cannot be separated, short of smashing

PRICES

	Each	$25.00 Lots	$50.00 Lots	$100.00 Lots	$300.00 Lots
Diatoric Molars and Bicuspids	$0.06	$0.05½	$0.05	$0.04½	$0.04
"Combination" Sets of 14	1.38	1.31	1.24	1.14	1.04
" " " 28	2.76	2.62	2.48	2.28	2.08

Save by buying at Quantity Rates and Paying Cash

	Retail Price	Quantity Price	Quantity Price less cash discount	Net Per Set	Money Saving on Retail Price	Percentage of Saving
20 Sets of 14	$27.60	$26.20	$24.89	$1.244	$2.71	9.8 per cent.
41 " " 14	56.58	50.84	48.30	1.178	8.28	14.63 "
88 " " 14	121.44	100.32	90.29	1.026	31.15	25.65 "
289 " " 14	398.82	300.56	270.50	.936	128.32	32.17 "



A Pair of Skilled Hands

can produce very satisfactory results with the SS Detached-Post Crown, which is in effect a Logan Crown with the post separate instead of being baked into the porcelain.

In it you have the nature-like form of the Logan, its conformation to the neck, its ease of grinding to the root, its strength of post. You have also whatever advantage in facility of manipulation you may find in fitting and setting post and crown separately.

When the mounting is completed, you have the beauty of the Logan, and as nearly its strength as your attachment of crown to post comes to that of baking the post in the porcelain.

No other separate-post crown has so many or so decided points of merit.

Send for Catalog and Booklet

The S. S. White Dental Mfg. Co.

THE S. S. WHITE

Detached=Post Crown

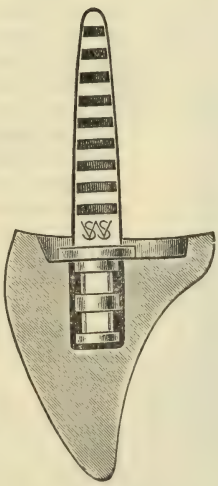
PATENTED APRIL 19, 1898

Detached Post

No. 1 No. 1 No. 2



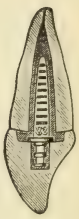
Edge View Face View Face View



Enlarged sectional view of S. S. White Detached-Post Crown complete.



Detached-Post Crown, Cuspid, fitted to root.



The same, sectional view.





Detached-Post Crown, Cuspid, mounted with gold collar and cap.



Detached-Post Crown, Biscuspid, fitted to root.



The same, sectional view, showing the splitting of the Post for a bifurcated root.

PRICES

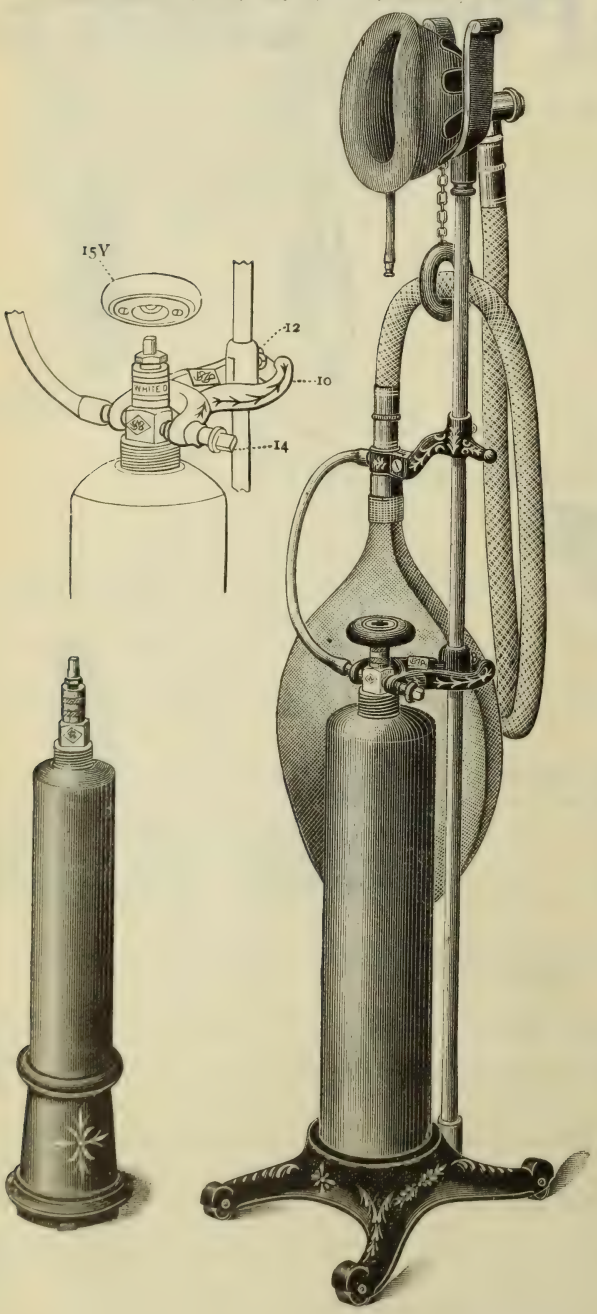
Single Crown with Post	each	$0.30
Lots of 100 Crowns with 100 Posts	"	.27
Lots of 200 Crowns with 200 Posts	"	.25
Crowns separately	"	.20
Lots of 100	"	.19
Lots of 200	"	.18
Posts separately	"	.10
Lots of 100	"	.08
Lots of 200	"	.07
Platinum Posts (size No. 1 only)	"	.60

A wood Tray, fitted to carry 100 Detached-Post Crowns, given free with every purchase of 100 Crowns. This Tray is similar, in all respects except the device for holding the Crowns, to our well-known Logan Crown Tray.

Universal Gas Stands

Universal Gas Stand No. 1

Patented March 22, 1898; May 15, 1900. D. R. G. M. No. 91,428



The convenience, compactness, and easy portability of our Universal Gas Stands greatly simplify the administration of nitrous oxid at the hands of the general practitioner of dentistry. If it were allowable to apply the term "efficient" where there is no active agency, we should say they were "efficient."

First, as to convenience. You have a holder which will take a gas cylinder, of 100, 200, 250 or 450 gallons capacity, supporting it in an upright position, and securing it so firmly at both ends that the manipulation of the valve can be regulated to the utmost nicety. You have independent supports for the valve-yoke, gas-bag, inhaler and inhaler tubing, each attached separately to a vertical rod set into the base. All the paraphernalia for administration is right to hand, and get-at-able.

Second, as to compactness. The entire apparatus occupies a floor space of about a square foot.

Third, as to portability. The feet are supplied with casters, so that the apparatus can be readily placed where wanted, without lifting it, and when not needed can be rolled into a closet or to a corner of the room.

As to other features, the base is heavy enough to hold the stand firmly. All the parts are of metal, except the fork for the inhaler, the ring for the support of the tubing, and the wheel-key for operating the cylinder valve, which are of wood. Base, pedestal, yoke connection, and support for the gas-bag japanned and ornamented; other metal parts nickel-plated.

Two styles, No. 1 for single cylinder, No. 2 for two cylinders.

Universal Gas Stand No. 1

Outfit includes—

Stand (for one cylinder)
Pedestal
Gas Bag (4½ or 7 gal.)
Inhaling Tube
Supply Tube
Inhaler No. 3 (see page 8).
Floor space required, 10½ x 12½ inches
Height, 3 ft. 7 in. (top of fork)

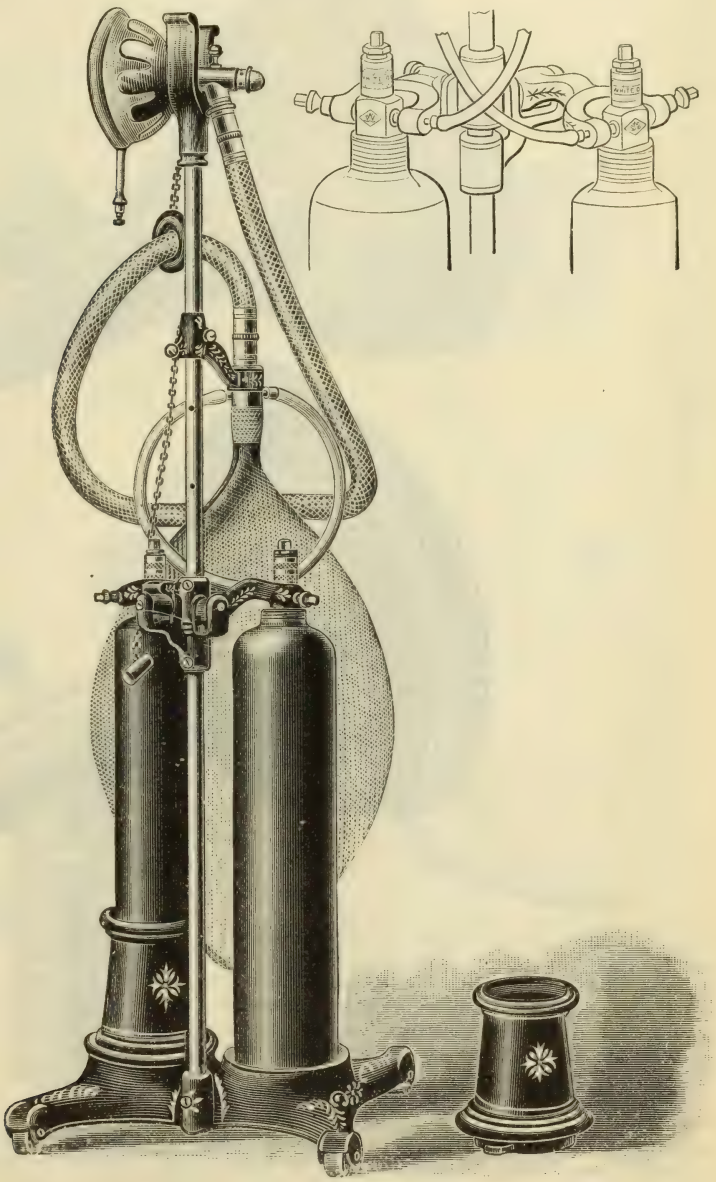
PRICES

Universal Gas Stand No. 1, as shown in the illustration, less Gas Cylinder, with 4½-gallon Bag	$23.25
The same, with 7-gallon Bag	24.00
Stand only, *i. e.*, less Inhaler, Bag, and Tubing	12.00

Universal Gas Stands

Universal Gas Stand No. 2

Patented March 22, 1898; May 15, 1900. D. R. G. M. 91,428



Universal Gas Stand No. 2

Sold as shown, less cylinders

Outfit includes—

- Stand (for two cylinders).
- 2 Pedestals.
- Gas Bag (4½ or 7 gal.).
- Inhaling Tube.
- Supply Tubes.
- Inhaler No. 3 (see page 8).

Floor space required—

- 12½ x 13½ inches.
- Height, 3 ft. 7 in. (top of fork).

PRICES

Universal Gas Stand No. 2, Complete, including 4½-gallon Bag, Inhaler, and Tubing, but without Cylinders	$31.25
The same, with 7-gallon Bag	32.00
Stand only, *i.e.* without Inhaler, Bag, and Tubing	20.00

INHALER NO. 3

Fig. 1

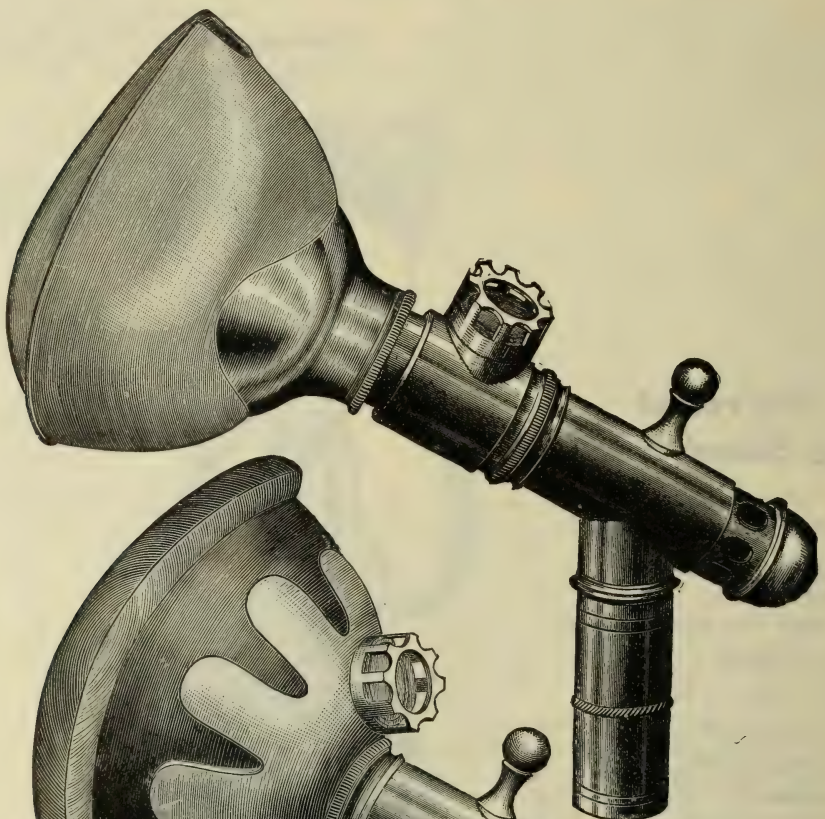
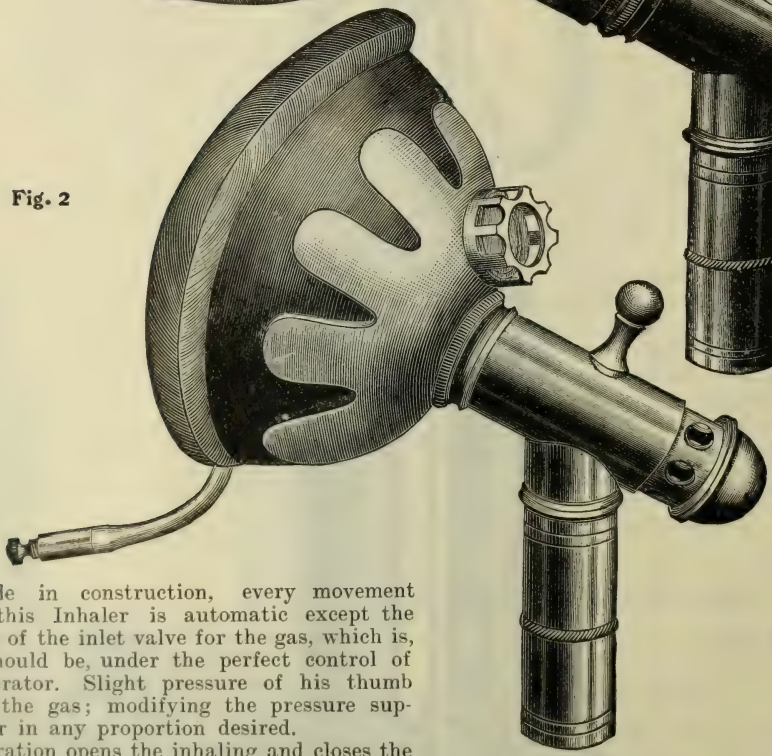


Fig. 2



Simple in construction, every movement about this Inhaler is automatic except the opening of the inlet valve for the gas, which is, as it should be, under the perfect control of the operator. Slight pressure of his thumb admits the gas; modifying the pressure supplies air in any proportion desired.

Inspiration opens the inhaling and closes the exhaling valves. Expiration closes the inhaling and opens the exhaling valves. Rebreathing an exhalation is impossible.

Sold with Flexible (soft rubber) Face-Piece (Fig. 1) or with Inflatable Rubber Face-Piece (Fig. 2).

In ordering, indicate which Face-Piece is wanted

PRICES

Complete as illustrated (with either Face-Piece)	$8.00
Inflatable Face-Piece, with Shield, Washer and Valve Caps necessary to adapt it to No. 3 Inhaler	4.50
Valve for Inflatable Face-Piece	.50
Inflatable Face-Piece (rubber portion only)	2.00
Flexible Face-Piece and Fittings only	2.00
" " " (rubber portion only)	1.00

Little Giant Separator

Invented by Dr. H. W. Gillett
Design Patent June 28, 1898

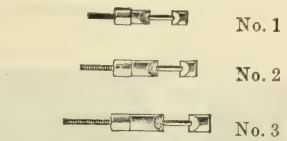
Small size, simplicity, and effectiveness are the special claims of this Separator to favor.

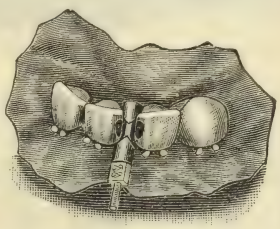
Its special use is in the immediate separation of teeth having small approximal cavities, though it can be used effectively wherever there is room to place it.

In use the nut and loose wedge are removed and the shaft passed between the teeth to be separated from the lingual or palatal side. The loose wedge is then returned to the shaft, followed by the nut, which is screwed up, forcing the wedges between the teeth till the desired room is gained. The nut is manipulated by a key or wrench, magnetized to enable it to pick the nut up readily. The round recess in the wrench is for handling the small, loose wedge of No. 1.

It is a mechanical "quick wedger."

Three sizes: No. 1 for use between incisors, Nos. 2 and 3 for bicuspids and molars. They may also be used as matrix holders. In matrix operations the Separator may often be applied without removing wedge or nut.

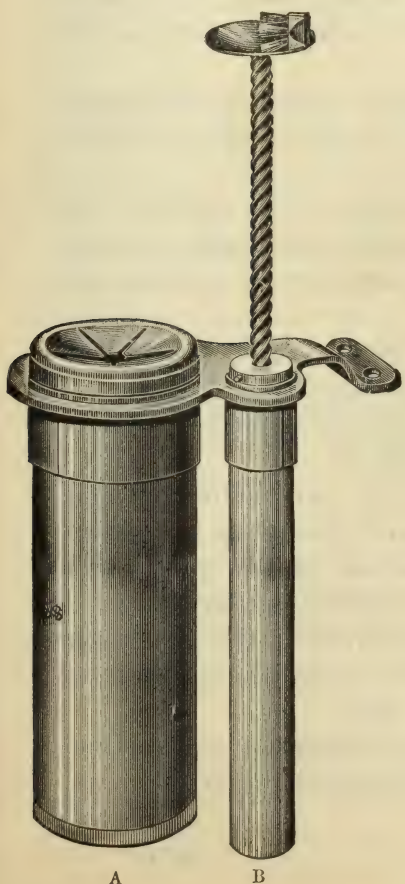






PRICES

Set complete with Wrench	$3.75
Separately, No. 1, No. 2, or No. 3	each 1.15
Wrench	.40



The ROBERTS COTTON PELLET ROLLER and WASTE-COTTON HOLDER No. 5

Patented May 5, 1891

The Roberts Roller makes cotton pellets quickly and cleanly, any size you want, and makes them neither too dense nor too loose, and all without touching the cotton with the fingers. You pick up the wisp of cotton with the pliers, carry it to the disk of the Roller (B), press the disk down to the cylinder, and lift off the pellet perfectly made.

Combining the Roller with Waste-Cotton Holder No. 5 as a receiver for the soiled pellets you have an ideal appliance for making and disposing of cotton pellets. Holder No. 5 is a cylindrical glass cup inclosed in a nickel-plated case with a star-shaped opening in the top. It is held by the same bracket which supports the Roller. The cup is readily removed and cleansed. A disinfectant placed in it will effectually prevent odor from the used pellets, which are scraped off the pliers through the star-shaped opening.

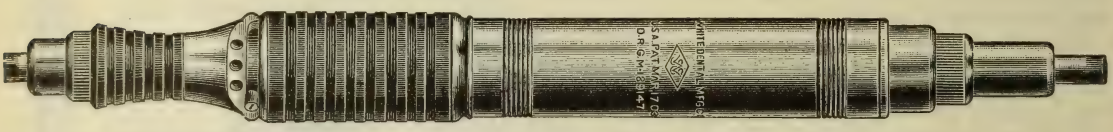
Pellet Roller sold separately or combined with the Waste-Cotton Holder, as illustrated. The combination outfit is a labor-saving attachment to the bracket-table.

PRICES

Roberts Cotton Pellet Roller (B)	$1.00
Waste-Cotton Holder No. 5 (A)	1.75
Roberts Cotton Pellet Roller and Waste-Cotton Holder	2.75

THE S. S. WHITE Automatic Mallet

Patented March 17, 1903. D. R. G. M. No. 189,147



This new Automatic Mallet is practically universal.

It affords every blow required in condensing gold from the merest touch to the heaviest impact.

It affords a range of blows not available elsewhere in automatic mallets, even though you have a half dozen of them.

These blows are in two series of six each,—the heavier series beginning where the lighter leaves off.

To change from one series to the other requires merely the reversal of the driving-spring.

The change from any blow in either series to any other in the same series is made instantly, by the movement of the adjusting screw, without opening the case.

Any blow can be changed to the one next lighter or heavier by almost infinite gradations,—the dentist can adjust the Mallet to secure exactly the blow he wants.

Whatever the stroke to which the Mallet is adjusted the operator can by simple manipulation, to which the Mallet lends itself readily, secure any lighter blow in the same series, without interfering with the adjustment.

From all this it follows that the blow can be made heavy, light, or intermediate without stopping to change the adjustment.

These are large claims,—the S. S. White Automatic Mallet justifies them. It is an innovation in automatic mallets.

The reversible spring constitutes it practically two mallets in one, each with a wider range and closer gradation of blow than any other.

The working parts are central and cylindrical, those upon which stress comes being made of hardened steel to provide against wear.

The engagement of pawl and ratchet,—one around the other,—is double-toothed, and the engaging surfaces are constantly shifting, so as to distribute and still further minimize the wear.

In a word, the S. S. White Automatic Mallet is superior in effectiveness, in adjustability of stroke, in variety and controllability of blows, and in durability.

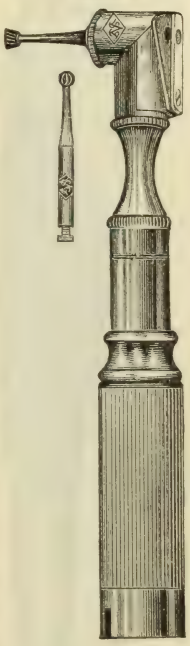
Price **$7.00**

IMITATIONS "JUST LIKE—?—"

If the Right-Angle were not distinctly superior it would not be, as it has been and is, more imitated than any other. As a matter of course, the imitations are inferior; they do not have the work put upon them that it has. They get what vogue they can from their resemblance to it in form and finish, and from the old, old cry, because of this resemblance, that they are "just as good as," or "just like" Whites' make. Isn't it about time that dentists have learned that there is no "just as good as" Whites' unless it bears the Trade Mark?

Our Right-Angle, whether as an Attachment or as an independent Handpiece, is simple in design, has few parts to complicate or weaken it, is strong in construction, true in working, lasting in wear.

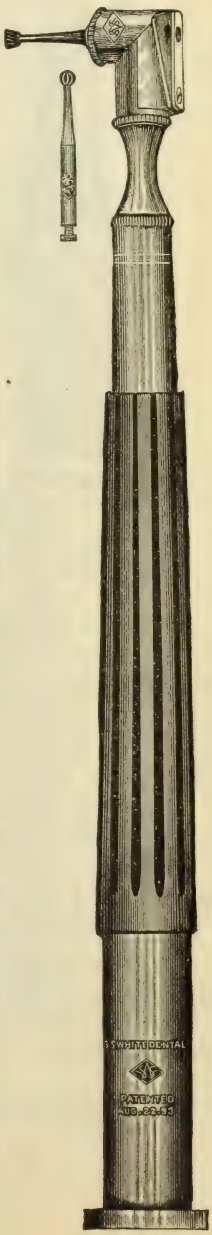
Right-Angle "A" for Handpieces 6, 7, and 8



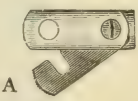
Right-Angle "B" for Slip-Joint



Right-Angle "C" for Doriot Handpiece



The entire bit is 7/8-inch long, and of this 1/2 inch is in the shank or bearing. The bit is locked in the socket by a pivoted latch A, which is accurate and certain in its adjustment.



Face view of Bit-Locking Device of the Right-Angle

The insertion or removal of a bit s simplicity itself, requiring only the opening of the latch, a slight turn of the bit, and the closing of the latch.

The first form slips over the handpiece, its spindle entering the nose of the handpiece the same as the shank of a bur; the second form goes on the Slip-Joint in place of the handpiece; the third, for the Doriot Handpiece, slips over the spindle after the removal of the handpiece case.

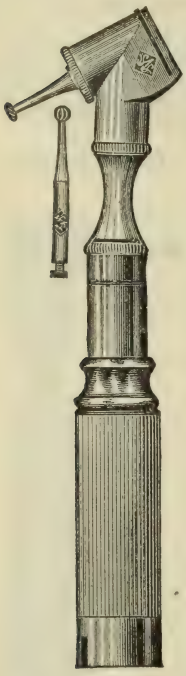
In ordering, specify by its letter which fitting is wanted, and in the case of "A," the number of the Handpiece with which it is to be used.

PRICES

Right-Angle "A," for Handpiece No. 6, 7, or 8, $4.00
" " "B," " Slip-Joint..... 6.00
" " "C," " Doriot Handpiece..... 6.00

ACUTE-ANGLES

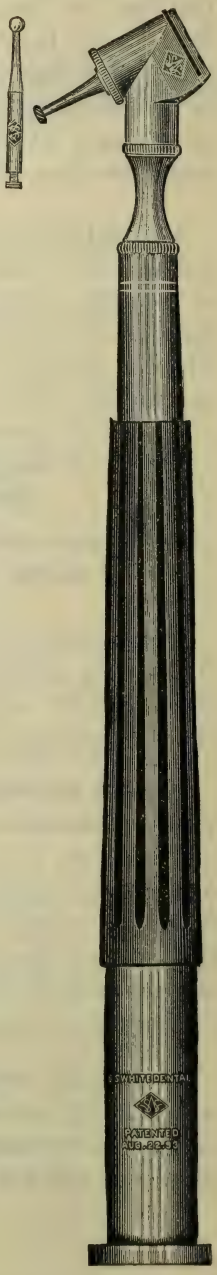
Acute-Angle "D" for Handpieces 6, 7, and 8



Acute-Angle "E" for Slip-Joint



Acute-Angle "F" for Doriot Handpiece



The construction of Acute and Obtuse-Angle Appliances is practically the same as of the Right-Angle. The advantages offered by them in the saving of time and work, in convenience and thoroughness, are such as should appeal to every dentist. Work can be done with their help thoroughly and properly in posterior cavities that without them are so difficult that the work is apt to be slighted as inaccessible.

When the engine is fitted with the Slip-Joint, the change from one form of appliance to another is made so readily that it is a habit easily gained to use the needed angle where required.

In ordering, specify by its letter which fitting is wanted, and in the case of "D," the number of the Handpiece with which it is to be used.

Price, Acute-Angle "D," for Handpieces Nos. 6, 7, and 8	each, $4.00
" " " "E," " Slip-Joint	" 6.00
" " " "F," " Doriot Handpiece	" 6.00

OBTUSE-ANGLES

Obtuse-Angle "G" for Handpieces 6, 7, and 8



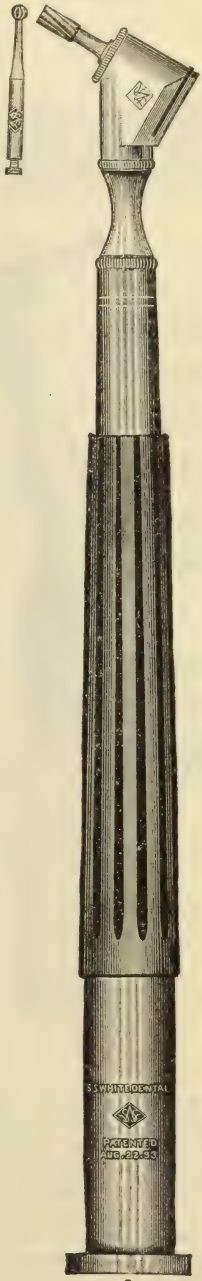
G

Obtuse-Angle "H" for Slip-Joint



H

Obtuse-Angle "J" for Doriot Handpiece



J

The method of securing the bit in the Acute-Angle and the Obtuse-Angle Appliances is the same as in the Right-Angle Appliances—the simplest and best plan ever devised.

The parts are few and simple in construction, made of tempered steel, carefully fitted, providing for accuracy of work and durability.

The Obtuse-Angle Appliances require that the motion of engine should be reversed.

In ordering, specify by its letter which fitting is wanted, and in the case of "G," the number of the Handpiece with which it is to be used.

Price, Obtuse-Angle "G," for Handpieces Nos. 6, 7, and 8	each	$4.00
" " " "H," for Slip-Joint	"	6.00
" " " "J," for Doriot Handpiece	"	6.00

CONTRA-ANGLE HANDPIECES

Invented and Patented by DR. WILLIAM E. HARPER

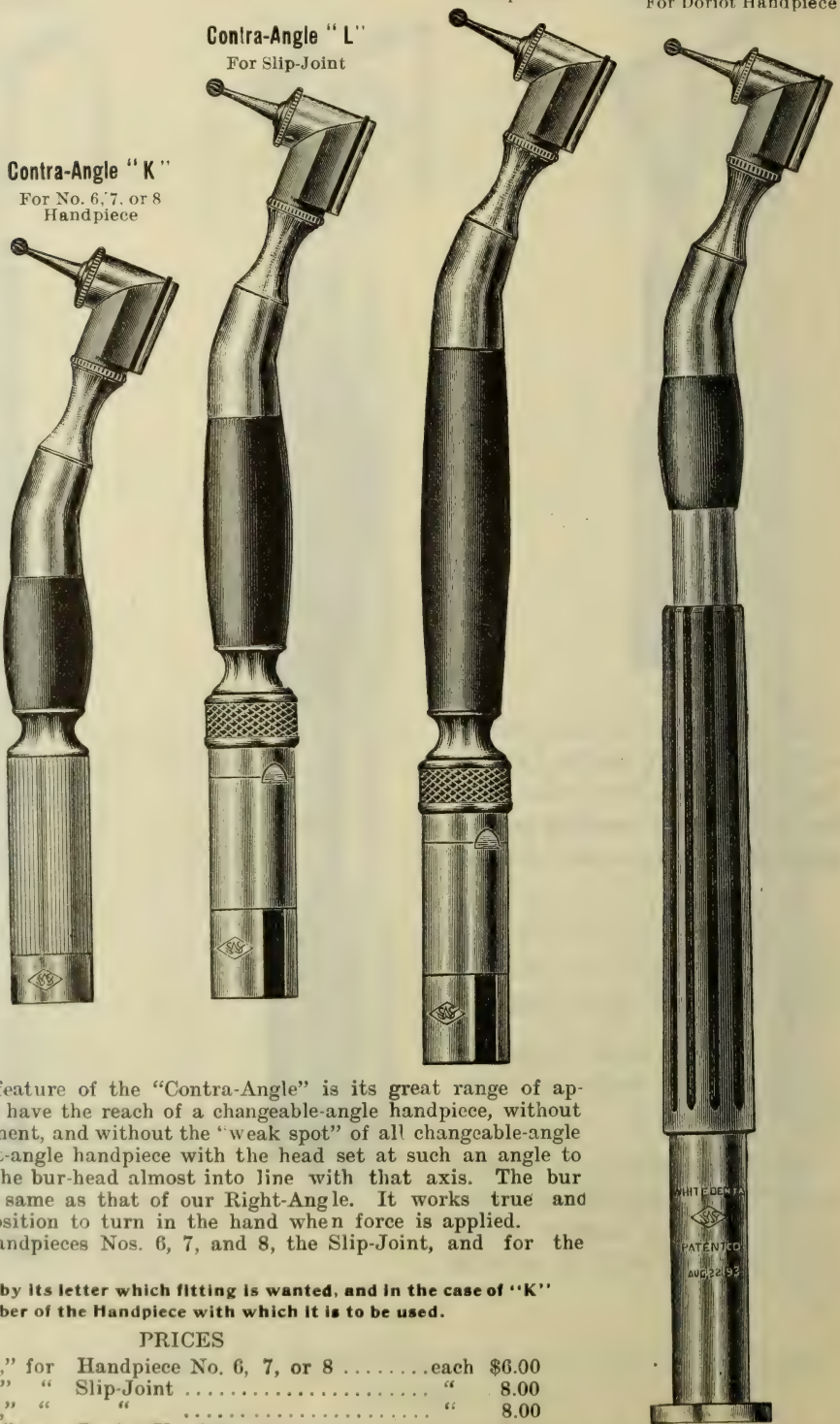
Patented June 19, 1900; design January 30, 1900; October 15, 1901. D. R. G. M. No. 158,666

Contra-Angle "K"
For No. 6, 7, or 8 Handpiece

Contra-Angle "L"
For Slip-Joint

Contra-Angle "M"
For Slip-Joint

Contra-Angle "N"
For Doriot Handpiece



The Reach and Applicability of a Changeable-Angle Head Without Its Disadvantages

No Tendency to Turn in the Hand or Rock Laterally

The characteristic feature of the "Contra-Angle" is its great range of application. In it you have the reach of a changeable-angle handpiece, without any trouble of adjustment, and without the "weak spot" of all changeable-angle devices. It is a right-angle handpiece with the head set at such an angle to the axis as to bring the bur-head almost into line with that axis. The bur locking device is the same as that of our Right-Angle. It works true and steady, with no disposition to turn in the hand when force is applied.

Made to fit our Handpieces Nos. 6, 7, and 8, the Slip-Joint, and for the Doriot Handpiece.

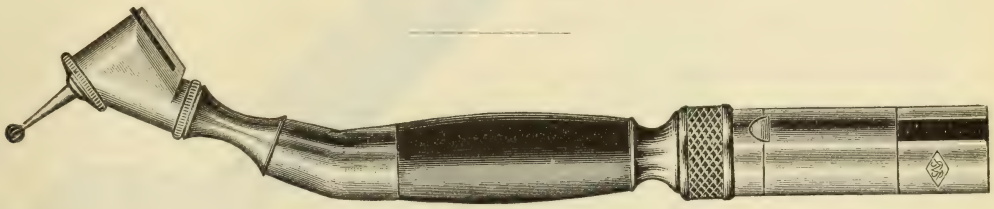
In ordering, specify by its letter which fitting is wanted, and in the case of "K" the number of the Handpiece with which it is to be used.

PRICES

Contra-Angle "K," for	Handpiece No. 6, 7, or 8	each	$6.00
" " "L," "	Slip-Joint	"	8.00
" " "M," "	"	"	8.00
" " "N," "	Doriot Handpiece	"	8.00

OBTUSE CONTRA-ANGLE

Patented August 19, 1890; June 19, 1900; design January 30, 1900; October 15, 1901
D. R. G. M. No. 158,666



Contra-angling the Right-Angle so considerably enlarged its sphere of action that the suggestion was made that the Obtuse-Angle should be improved along the same lines. The first advantage of the Obtuse Contra-Angle is that the head of the working bur is brought into line with the axis of the spindle. A second is that while permitting as free access to the class of cavities heretofore included in the range of the Obtuse-Angle, it can be used in cavities nearly within, but just out of, convenient reach of the straight handpiece.

The bit-locking device is the same in all our Angles.

As with all Obtuse-Angles the motion of the engine must be reversed.

Made with fittings for Nos. 6, 7, and 8 Handpieces, for the Slip-Joint, and for the Doriot Handpiece.

In ordering, specify by its letter which fitting is wanted, and in the case of "O," the number of the Handpiece with which it is to be used.

PRICES

Obtuse	Contra-Angle	"O,"	for	Handpiece No. 6, 7, or 8	$6.00
"	"	"P,"	"	Slip-Joint	8.00
"	"	"Q,"	"	Doriot Handpiece	8.00

One Way to Prevent Wear of the Handpiece

This matter of wear of the handpiece—its durability—is largely predetermined by the workmanship put upon its parts.

Remember that there is always friction between two pieces of metal working upon each other, and that friction means wear. The smoother the surfaces when put to work upon each other, the less will be the friction and the consequent wear.

The bearing parts of a handpiece are examples. If, as sold, they are closely fitted and have a smooth finish, the wear, with proper cleaning and oiling, will be reduced to the minimum, and the fit will be undisturbed; in other words, the handpiece will have durability.

If, on the other hand, the fit is only apparent and the fine finish is absent, natural law will have its way. Friction will produce the fine finish, but in producing it will destroy the fit.

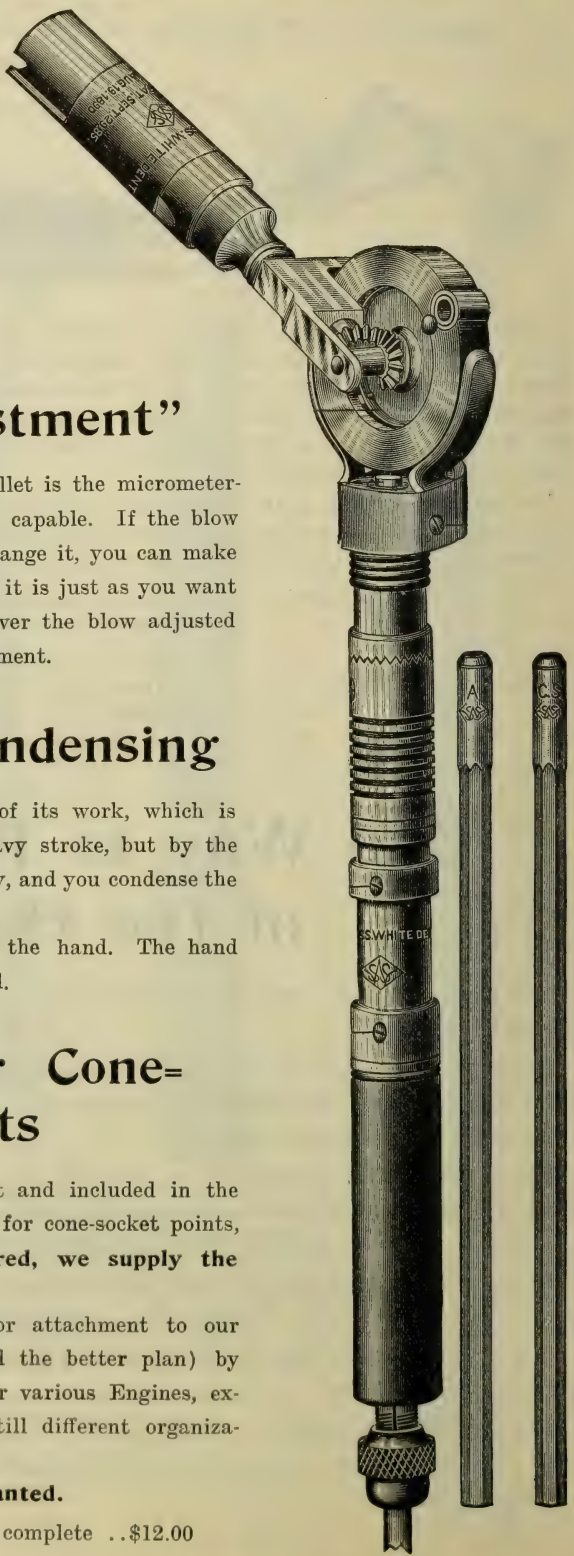
In buying a handpiece take it apart, examine the fitting and finish of its parts, to make sure that they are what they should be.

The S. S. White Handpiece No. 7 will bear the closest scrutiny. Most of its bearings are of hardened steel, it runs true, and it will hold any straight-shank bit within the diameter limits of our manufacture.

Price $7.00

Engine Mallet No. 3

Patented April 15, 1890
Patented September 5, 1893
D. R. G. M. No. 101,898



"Micrometer Adjustment"

Perhaps the most important feature of this Mallet is the micrometer-like closeness of adustment of which its blow is capable. If the blow does not suit you, if for any reason you wish to change it, you can make it heavier or lighter by very minute gradations till it is just as you want it. The change can be made instantly, and whatever the blow adjusted for, you get that blow till you change the adjustment.

Rapid, Thorough Condensing

Another important feature is the effectiveness of its work, which is accomplished, not by the mere power of a heavy stroke, but by the rapid succession of light taps. You work rapidly, and you condense the gold evenly and thoroughly.

The Mallet is light, and balances perfectly in the hand. The hand grasp is of vulcanite, giving a comfortable feel.

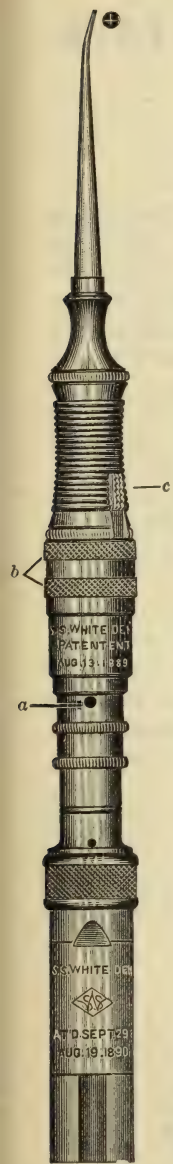
For Automatic or Cone-Socket Points

Six socket handles are supplied with each Mallet and included in the price. These socket-handles are for automatic or for cone-socket points, as may be preferred. **Unless otherwise ordered, we supply the former.**

The yoke is made in various modifications for attachment to our Handpieces Nos. 6, 7, and 8, or (which we regard the better plan) by means of the Slip-Joint direct to the arms of our various Engines, except the Weber-Perry and Doriot. For these a still different organization is supplied.

In ordering, always specify the fitting wanted.

Price, any fitting, with Six Socket-Handles, complete ..$12.00



Engine Mallet No. 4

Patented August 13, 1889, and August 19, 1890

Engine Mallet No. 4 is a real *multum in parvo*. It is an effective, durable appliance and it is very small.

It has the directness and effectiveness of the hand-mallet blow combined with the speed of the electric; adjustability of the force of the blow to suit the needs; a condensing force the same at the slowest speed as at the highest; easy means for arresting the blow without stopping the running; simplicity and compactness of construction; durability.

It takes the regular Automatic Mallet points; it works with the Engine running in either direction; it is easily kept in order, and its durability is assured by careful proportioning and the liberal use of hardened steel at wearing points.

PRICES

With Fittings for Nos. 6, 7, and 8 Handpieces	$6.00
With Fitting for Doriot Handpiece or Slip-Joint	8.00

Be sure to specify which fitting is wanted

INTERMEDIARY

AN ANTISEPTIC NON-CONDUCTING PULP-EXTRACTOR

Prepared by W. D. DeLONG, M.D., D.D.S., and GEO. F. DeLONG, D.D.S.

Intermediary eliminates the liability to pulp-irritation common to all deep cavities filled with gold or amalgam.

It is non-conductive to heat and cold,—no metals or metallic compounds enter into its composition.

Applied to the surface of a cavity it prevents thermal shock

It is non-irritating. Flowed over an exposed, aching, or inflamed pulp, it gives immediate relief.

It is antiseptic,—thoroughly disinfects the cavity and inhibits the growth of bacteria.

It fuses at a little above body temperature, making its application easy for the dentist, comfortable for the patient.

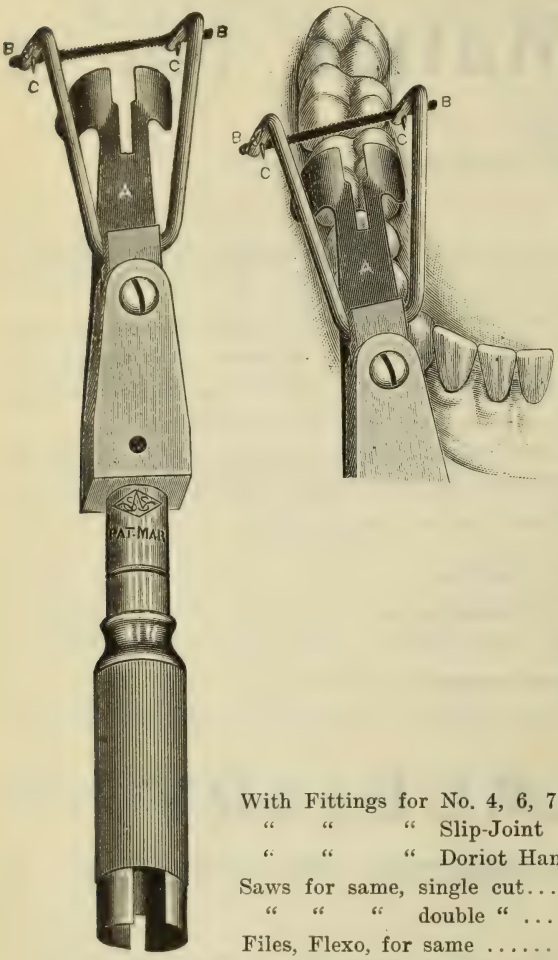
It hardens sufficiently in from one to two minutes—depending on the heat and quantity employed—to permit the packing of gold upon it.

The ease of manipulation—a warmed burnisher flows it—and the successful results which follow the use of Intermediary, appeal to every practitioner and enjoin its use in all except shallow cavities.

In the form of granules, and put up in a shallow saucer-shaped opal glass box or container with screw-cap. The shallow container brings the granules handy to the instrument which picks them up. Each box contains enough Intermediary to treat from one hundred to one hundred and fifty teeth.

Price .....per box $1.00

THE S. S. WHITE DENTAL MFG. CO., Sole Agent



FILE, SAW, AND TAPE CARRIER

Invented by Dr. A. J. Brown
Patented March 31, 1896

This appliance brings to the work of separating, smoothing, or polishing between teeth, in any part of the mouth, the efficient help of the dental engine.

It consists of a Carrier, C, adapted to be operated with a cam by the dental engine, and supplied with a rest, A, which prevents vibration of the carrier and holds it steadily to its work; it also prevents a sudden dropping of the saw onto the gum. Files or tapes can be used with equal facility. In using a tape the ends of the tape are brought around and caught over the little studs at C. The arms of the Carrier maintain a spring tension which allows the tape to conform to the tooth-curves to a considerable degree.

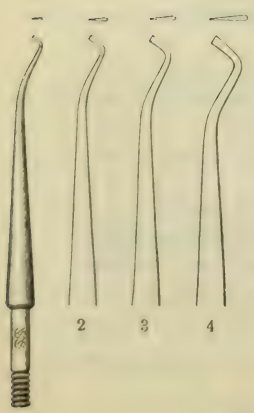
The advantages of the rapid motion of the engine in this branch of dental work, and the perfect control under which the device is run, will commend this Carrier to the dentist. Those who have used it speak of it as a very practical appliance.

PRICES

With Fittings for No. 4, 6, 7, or 8 Handpiece	each	$5.00
" " " Slip-Joint	"	5.00
" " " Doriot Handpiece	"	5.00
Saws for same, single cut	per doz.	.25
" " " double "	"	.38
Files, Flexo, for same	"	.75

Be sure to specify which fitting is wanted

Contra-Angle Excavators

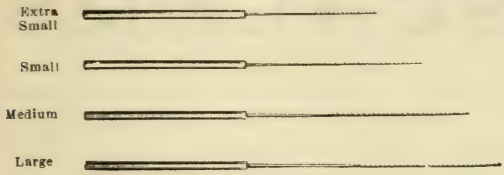


The Contra-Angle principle finds one of its most effective expressions in the four Excavators here offered. In manipulating a hand Excavator the power is applied through the shaft of the instrument. Recurving the shaft so as to bring the cutting edge into line with the axis greatly increases the power; rather, conserves it. In other words the power applied to the contra-angled shaft is delivered directly and undiminished to the cutting edge. The Contra-Angle Excavator has no tendency to wabble when the power is applied, holds its working position almost without effort on the part of the operator. The Contra-Angle also affords a considerable advantage in reaching cavities inaccessible to a straight-shaft instrument.

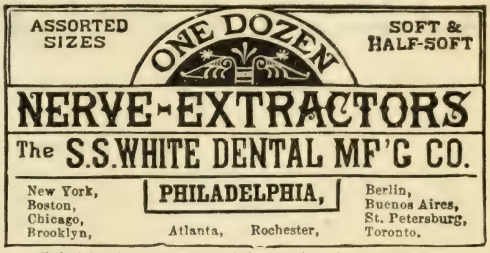
Four sizes as shown. Made only as Cone-Socket points.

Price ..... each $0.12

BARBED NERVE-EXTRACTORS



THESE SIZES MEAN LENGTHS, NOT DIAMETERS
ALL SIZES, IN "SOFT" AND "HALF-SOFT" TEMPERS



This label is a guarantee of the quality of our Extractors

Think what the Ideal Broach should be,—how thin, how tough, how perfectly barbed. These of ours are nearer the ideal than you will find elsewhere.

SOLD IN SEALED PACKAGES AS FOLLOWS:

No. 1, containing one dozen assorted small, extra small, medium, and large sizes,—Soft and Half-Soft.

No. 2, containing one dozen extra small,—Soft and Half-Soft.

No. 3, containing one dozen small,—Soft and Half-Soft.

Other assortments to order without extra charge.

Price ..... per package $0.50; per gross $5.00

Iridium-Platinum Nerve-Extractors



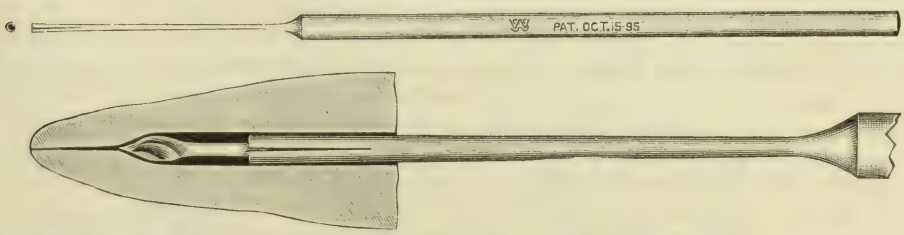
Points of an Iridium and Platinum alloy, the handles of steel, nickel-plated; can be readily cleansed and sterilized by heating to redness in a spirit lamp. They have ample flexibility and toughness, and are not corroded by iodin, acids, or dampness. Barbed and hooked. (SPECIFY WHICH IS WANTED.)

Put up in quarter-dozen boxes, with grooved blocks for safe carriage.

Price ..... per ¼-dozen package $1.20

DRILL EXTRACTOR

Patented October 15, 1895



Undue pressure on a Root-canal Drill will sometimes cause the drill-head to break off in the canal. This Extractor has a split and threaded cone-socket, which, when carefully pushed and turned in the canal, will seize the broken drill-shank and effect its extraction. In some cases it may be best to first enlarge the canal before inserting the Extractor, which is shown in position by the illustration.

Price $0.60

The SS Plate and Wire Guide

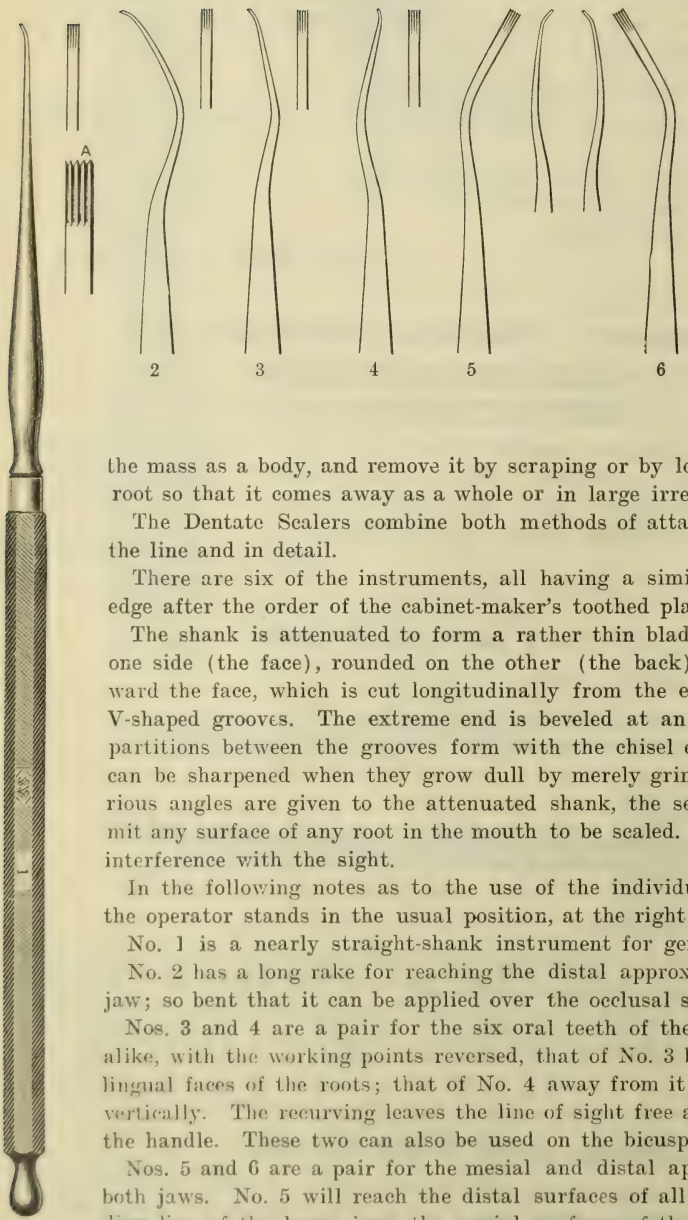
Facilitates the selection of plate and wire by dentists. It shows by actual samples, numbered according to Brown & Sharpe's American Standard Gage, the sizes of wires—round and half-round—and thicknesses of plates used in the dental laboratory, affording an ample range for almost any operation.

The dentist who has this Guide has at all times the assistance of accurate examples in selecting the proper thickness of wire or plate for a given operation, and has only to order by the gage number.

Price $0.40

DENTATE SCALERS

Designed by Dr. Edward C. Kirk



A new principle in the removal of tartar would scarcely be looked for in these days; but these Dentate Scalers embody such a principle,—old and widely used in mechanics, not unknown in dentistry, but new to this particular work.

The two conventional forms of scalers are, first, those having a single point, and second those having a comparatively broad edge, for either push or pull cut. The first act by cutting a groove through the mass, which repeated often enough removes the entire concretion. The second act upon the mass as a body, and remove it by scraping or by loosening its attachment to the tooth or root so that it comes away as a whole or in large irregular masses.

The Dentate Scalers combine both methods of attack,—the point and the blade; all along the line and in detail.

There are six of the instruments, all having a similar dentated working point or cutting edge after the order of the cabinet-maker's toothed plane-bit.

The shank is attenuated to form a rather thin blade, a sixteenth of an inch wide, flat on one side (the face), rounded on the other (the back). Near the point it is bent over toward the face, which is cut longitudinally from the end to or beyond the bend into narrow V-shaped grooves. The extreme end is beveled at an angle of about 45° to the face. The partitions between the grooves form with the chisel edge of the end a series of teeth, which can be sharpened when they grow dull by merely grinding the bevel at the same angle. Various angles are given to the attenuated shank, the set affording sufficient variation to permit any surface of any root in the mouth to be scaled. All are so formed as to work without interference with the sight.

In the following notes as to the use of the individual instruments, it is understood that the operator stands in the usual position, at the right side of the chair.

No. 1 is a nearly straight-shank instrument for general purposes.

No. 2 has a long rake for reaching the distal approximal surfaces of the molars in either jaw; so bent that it can be applied over the occlusal surfaces.

Nos. 3 and 4 are a pair for the six oral teeth of the lower jaw. The shanks are recurved alike, with the working points reversed, that of No. 3 being bent with the curve, to reach the lingual faces of the roots; that of No. 4 away from it for the labial surfaces. They are used vertically. The recurving leaves the line of sight free and keeps the point within the axis of the handle. These two can also be used on the bicuspids.

Nos. 5 and 6 are a pair for the mesial and distal approximal surfaces of all the teeth in both jaws. No. 5 will reach the distal surfaces of all the teeth on the right side of the median line of the lower jaw; the mesial surfaces of those on the left side. In the upper jaw it is used as a distal instrument on the left side, mesial on the right. No. 6 is distal for the lower teeth of the left side, mesial for the lower right; mesial for the upper right side, distal for the upper left.

DENTATE SCALERS—Continued.

The dentated edges of these instruments have several advantages. Having several points in touch with the deposit or the root at the same time, they ride steadily and there is little chance of their slipping off laterally to wound the gum. They have a well-defined tendency to follow the line of force, cutting a series of grooves through the mass of the deposit, breaking it into small fragments which are loosened from their attachment.

Of course their use is in breaking up and removing the deposit; they should be followed by suitable smooth-edged instruments of the usual forms, to give the root a perfectly smooth surface. So used they will be found a very efficient helper in the removal of tartar.

Made as long-handle (ball-end) instruments or as points for cone-socket handles.

PRICES

File-cut Handles	each	$0.55
Cone-socket Points	"	.40

ORANGE WOOD

The perfect suitability of Orange Wood for quick wedging is certified by the long years during which it has been the recognized standby of the dentist for this use.

It is not only useful for wedging, but is specially adapted for carrying polishing powders for cleaning the teeth.

This of ours is of carefully selected quality.

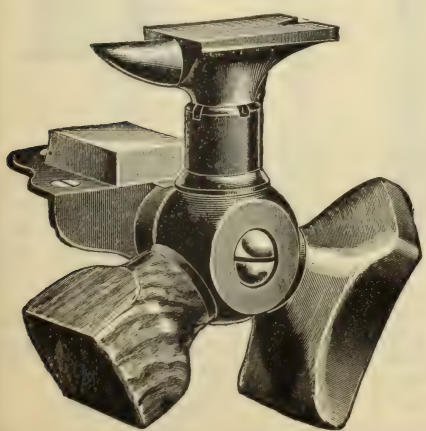
Two sizes, large and small,—shown in the diagrammatic end views.

Price, either size, per bundle $0.10



Revolving Combination Anvil and Bench Block

Devised by G. W. Melotte, M.D.S.
Patented Sept. 13, 1892.



This combination tool consists of a hub carrying a case-hardened steel anvil, a par-vulcanized rubber block for filing, and a wood block for the same purpose, mounted on a bracket to be fastened to the work-bench of the laboratory. It is adjusted by pulling out the hub slightly, revolving it until the proper appliance is in position, then releasing, when it is held firmly as placed by a friction-clutch. The bracket also affords a hammering surface.

Price, complete $3.00

DUPLICATE PARTS

Brackets	each	$0.50
Anvils	"	1.00
Rubber Blocks	"	.35
Wood "	"	.15

The S. S. White Dental Manufacturing Co.

Sole Agent for the dental trade for all countries except the United Kingdom of Great Britain and Ireland

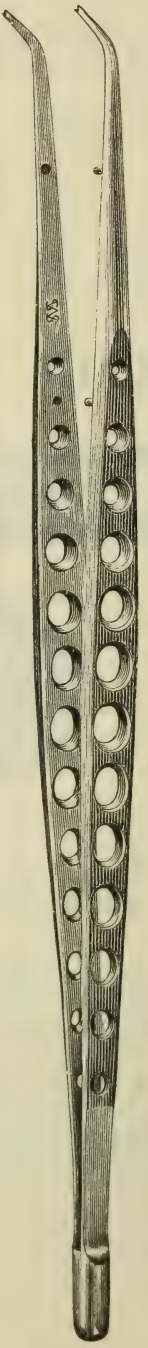
FOIL CARRIERS AND PLIERS



No. 2

Octagon Handle

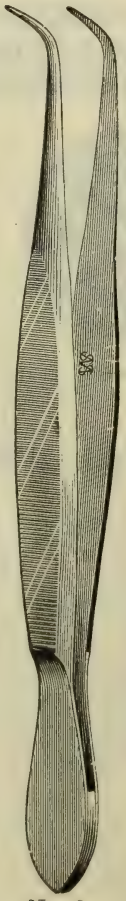
Nickel-plated,
$1.75



No. 3

Dr. Rich's

Nickel-plated,
$2.50

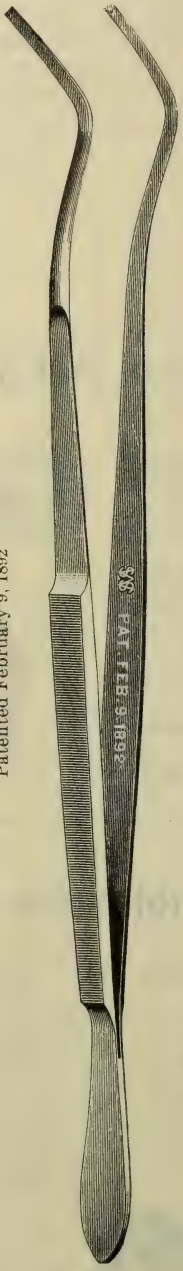


No. 6
4½ in.
Curved

Nickel-plated,
$1.00

DR. HOW'S PELLET PLIERS

Patented February 9, 1892



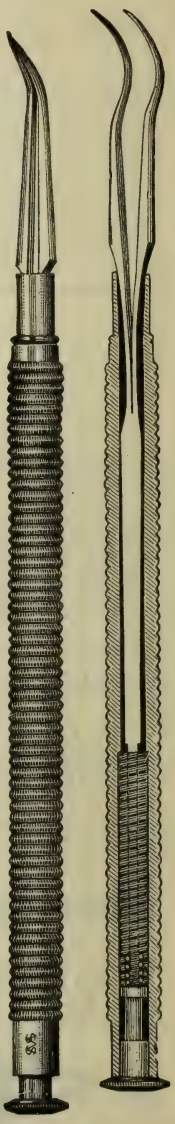
No. 21

With the Pellet Pliers a pellet of foil or mat gold may be placed with the least possible risk of squeezing it out of shape by undue pressure.

Price, Nickel-plated, $1.25

SPRING RETRACTION PLIERS

Suggested by Dr. A. H. GILSON



No. 22A No. 22B

These Pliers are governed by a push-button screwing into the head of the coil-spring, at the end of the handle, allowing the "grip" to be readily varied.

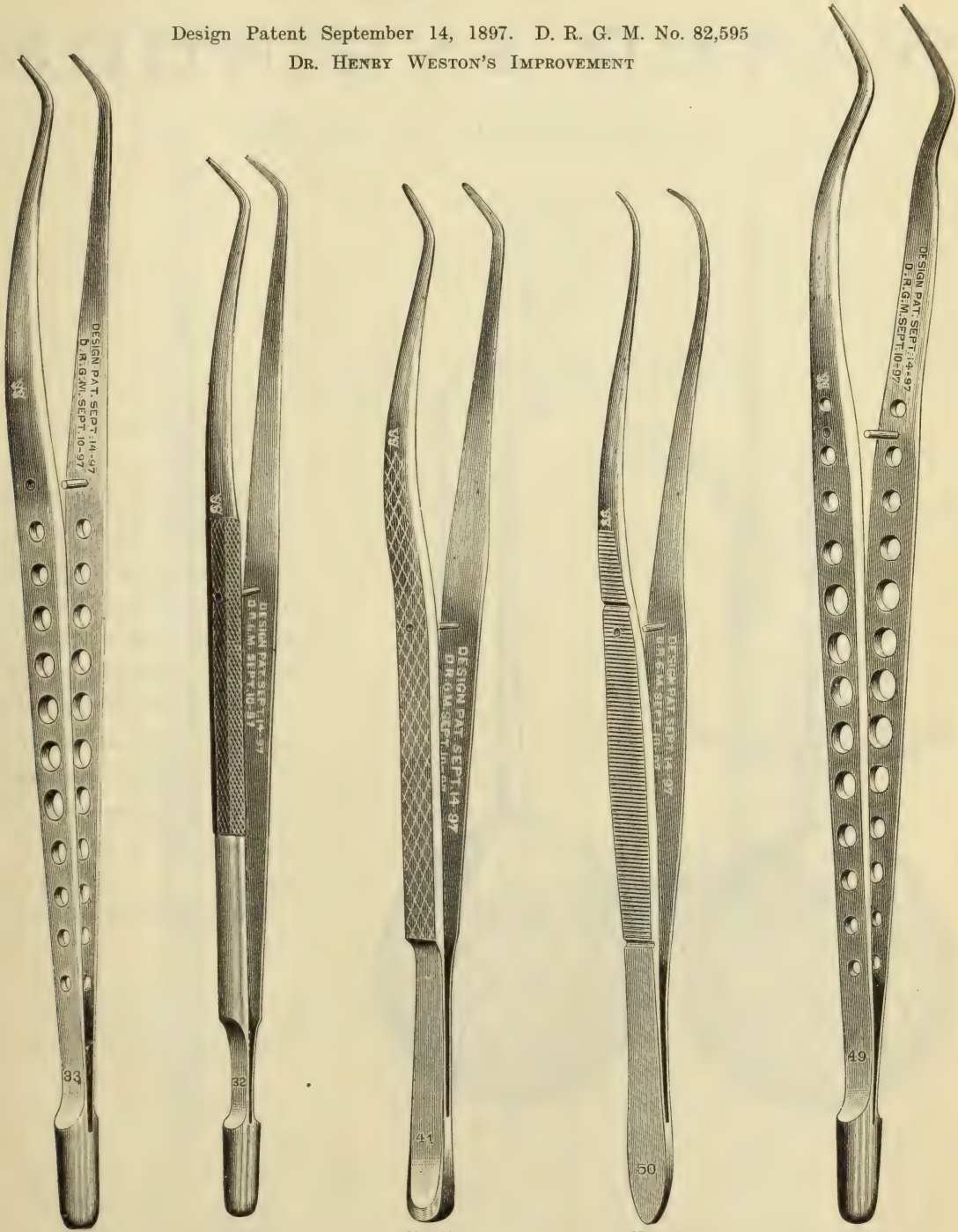
Made with jaws of two angles, designated A and B.

Price of either,
Nickel-plated $1.50

FOIL CARRIERS—Continued

Design Patent September 14, 1897. D. R. G. M. No. 82,595

Dr. Henry Weston's Improvement



No. 33 No. 32 No. 41 No. 50 No. 49

All these Pliers are finely nickel-plated.

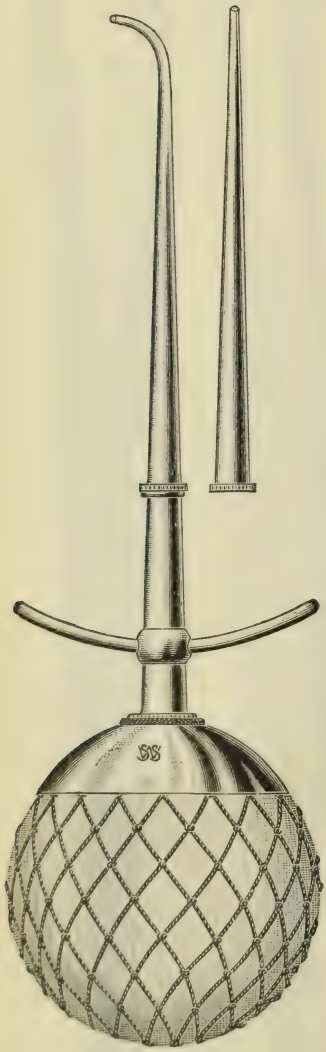
PRICES

No. 33.	Dr. Rich's Foil Carrier and Plugger with Weston's Improvement	each	$2.75
" 32.	" " " " " "	"	2.00
" 41.	"The College" Pliers,	"	1.25
" 50.	Watling "	"	1.50
" 49.	Meriam's Long Foil-Carriers and Pluggers	"	3.00

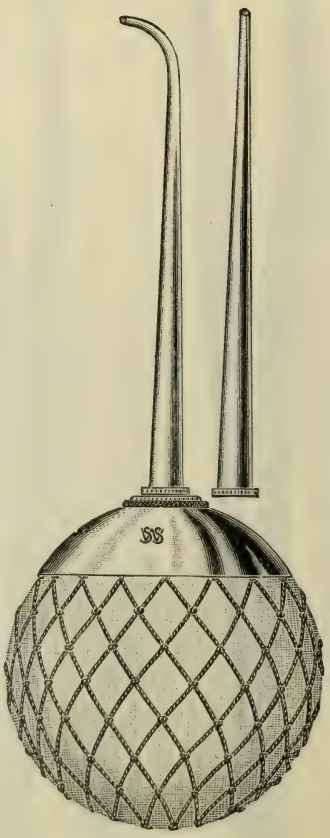
REDUCTION

WATER SYRINGES

Dr. George T. Moffatt's Bulb Tooth Syringe



No. 21A



No. 21B

The Moffatt Bulb Tooth Syringe is now sold in four forms, as described below, each of which will suit some purchasers better than any of the others. The quality of all is the same—in fact the parts are exactly alike and interchangeable except that the finger-hold found in No. 21A is not supplied with the other numbers. All metal parts are nickel-plated and the bulb is protected by silk netting.

The illustrations are exact size.

PRICES

No. 21A, syringe as illustrated with bulb, net, shield, finger-hold and one curved and one straight point	each	$1.00
No. 21B, as illustrated with bulb, net, shield and one straight and one curved point	"	.80
No. 21C, with bulb, net, shield and one curved point	"	.60
No. 21D, with bulb, net, shield and one straight point	"	.60

THE UNIVERSAL SCALERS

Suggested by Burton Lee Thorpe, M.D., D.D.S.



These instruments are especially adapted for the rapid and thorough removal of salivary calculus from either upper or lower teeth. The shape of the blades and their angle to the shank make it possible for them to reach every surface of each tooth, no matter how difficult of access it may be. Used with both push and pull cut.

Price, Long Handle.....each $0.50
" Cone-Socket Point..... " .35

The Lane Blowpipe

Owes its superior efficiency to the fact that it works on precisely the opposite principle from that involved in most implements of its class.

As a rule, the blowpipe is movable, held in the hand, and the flame is directed by the hand holding it to the work to be soldered.

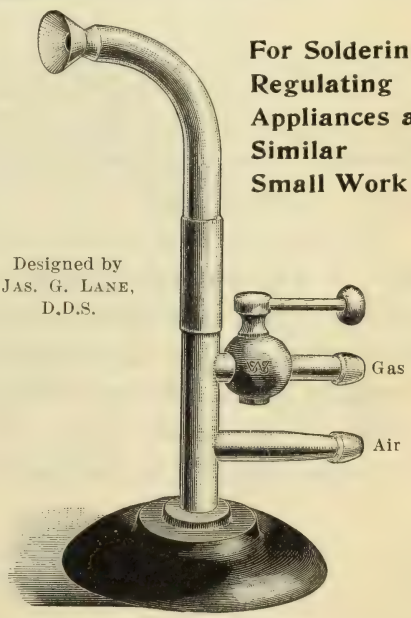
In the Lane, the blowpipe is stationary, and both hands are free to manipulate the piece, which is thus brought under the influence of the flame in such wise that the most delicate point can be soldered.

The flame can be made very thin, not over an inch or an inch and a half in length, and extremely fine, almost needle-pointed, and it is under perfect control at whatever stage.

It can be used as the ordinary blowpipes are, but the best way, the way in which its designer intended it to be used, is to connect with the gas supply, and regulate the flow so as to get it right for your purpose. Set the Blowpipe on the table

For Soldering Regulating Appliances and Similar Small Work

Designed by Jas. G. Lane, D.D.S.



with the flame funnel away from you, looking to the front. Start the blowing, bring the piece around in front of the flame, using both hands, with the elbows resting on the table. This gives you perfect control, so that, having the Blowpipe between you and the work, with your eye sighting along the flame, you can bring the work—the exact part to be soldered—up to the flame point. The instant the solder melts, stop blowing, and hold immovably for the second or two necessary to set the solder. You will have a piece of work, provided you have properly attended to the preliminary steps (the positioning of the parts and the solder and flux), that you will be proud of.

The Lane Blowpipe is an upright pipe, curved at the top, equipped with nipples for air and gas supply,—the latter governed by a lever stop-cock. It is set in a substantial japanned metal base, the whole about 5½ inches high. Can be operated with the mouth or with foot-bellows.

Price $2.00

How We Move in Cycles

The tendency of affairs terrestrial to move in cycles has often been observed and remarked. Another illustration is to be found in the story of the appliance described below.

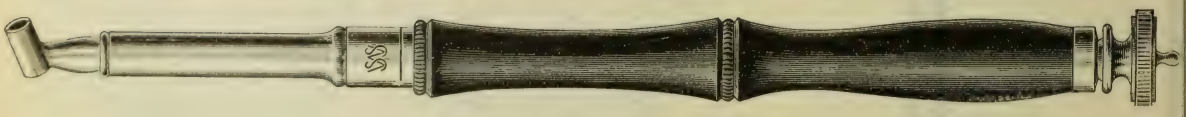
Just about thirty years ago (September 1875) we illustrated and described a (then) "New Adjustable Porte-Polisher," devised by Dr. Louis Jack, to carry orange-wood for polishing the teeth or fillings in them. Here is the old illustration:



It had its day of greater or less popularity, and then gave way to the spreading use of the dental engine, to which also the porte-polisher was adapted. The hand porte-polisher then swung pretty far into oblivion, but now it is coming back.

Within the past year or two, the "prophylactic" cult, of which Dr. D. D. Smith is the foremost exponent, has stimulated an enormous interest in perfect cleanliness as the surest safeguard for the teeth. They have demonstrated that "finger manipulation" affords a vastly more delicate touch than the engine in the removal of the last vestiges of deposits—serumal or salivary—from the necks and roots of teeth. And they have found nothing quite so exactly adapted to holding the orange-wood stick to the work as the

ADJUSTABLE PORTE-POLISHER



Accordingly we reintroduce it. It is modified a little as to the hand-hold, to facilitate a more delicate touch; made perhaps a little more nicely; otherwise it is the same as it was. Clamping jaws controlled by a milled thumb-nut at the opposite end of the handle, grasp the orange-wood firmly at an angle which gives almost unlimited possibilities in manipulation. You can reach and polish any surface of the teeth.

Handle of Black Vulcanite; metal parts nickel plated.

Price $1.50

Formagen is a Cement, not for Filling Teeth, but to be used as a Lining in Sensitive Cavities and over Exposed and Inflamed Pulps

TRADE
MARK
Registered Feb. 22, 1898. No. 31,299



Its use is indicated:

(a) Wherever caries approaches so near the tooth pulp as to leave but a doubtful amount of protective dentin.
(b) When an accidental exposure of the pulp is made in excavating the carious dentin.
(c) When through neglect a recent exposure is apparent, with or without acute pulpitis.
(d) In multiple-rooted teeth where the finer canals are inaccessible.

In all these cases it offers a successful alternative to the destruction of the pulp.

The pain of inflamed pulps is quickly lulled by the application of Formagen, and a filling of cement or gutta-percha or amalgam can be put in over it without delay. Formagen is entitled to a test of its qualities, especially in cases where without it extirpation or the forceps are the alternatives. Applicable in all stages of pulpitis, but contraindicated in periostitis.

Formagen as sold comprises a powder and a liquid, put up in glass-stoppered bottles, with directions, inclosed in a wooden box. When mixed in accordance with the directions, it is somewhat sticky, adheres to the instrument. Dipping the instrument into the powder will cure that.

Two sizes of packages, the larger double the size of the smaller.

PRICES

SMALL PACKAGES

Per box		$1.50
Liquid or Powder, separately	per bottle	.75

LARGE PACKAGES

Per box		$2.50
Liquid or Powder, separately	per bottle	1.25

"THE OLD RELIABLE"

LAWRENCE'S  AMALGAM

With a single exception, Lawrence's is the oldest amalgam now on the market. That it has endured through forty years or more of widespread use is strong testimony to its character.

Lawrence's Amalgam is always put up in a white lithographed envelope covering a brown one containing the amalgam, with Trade-Mark on the lap of each, and both copyrighted. Put up in ⅛-oz., ½-oz., and 1-oz. envelopes.

PRICES

1 oz.....$3.00 2 oz.....$5.50 4 oz.....$10.00 10 oz.....$20.00 20 oz.....$35.00

THE S. S. WHITE DENTAL MFG. CO., Sole Agent

HIGH-FUSING MEDIUM-FUSING

PORCELAIN



Two Porcelain bodies, alike in their twenty-five colors,—one Shade Guide serves for both,—and differing only in their fusing-points, offer ideal conditions for inlay or crown-work.

Each can be used by itself for the entire piece, because it will maintain carved lines in fusing and give dense, strong work; or, the Medium-Fusing can be fired upon the High-Fusing with the certainty that the color will be uniform.

The variety of shades covers every usual need. Combinations of two or more make any required shade easy.

Platinum matrix for both.

The working outfit is the same in both; the case contains the twenty-five shades, lettered from A to Z, a double-end carving-tool, locking-tweezers "K," pipette bottle, and mixing spatula No. 13.

PRICES

HIGH-FUSING OR MEDIUM-FUSING PORCELAINS

Complete set, including Shade Forms and Stand	$12.50

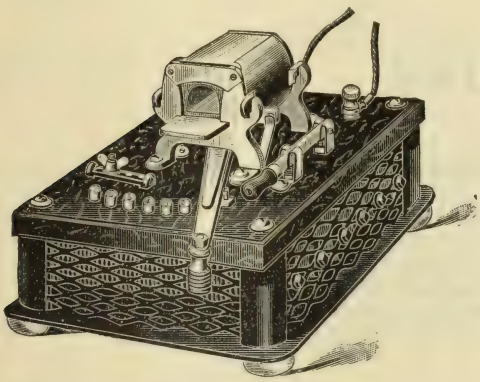
PARTS SEPARATELY

Case containing twenty-five jars High- or Medium-Fusing Porcelain, 1 Inlay Carver No. 5, 1 Locking Tweezers "K," 1 Pipette Bottle, 1 Spatula No. 13	$10.00
Shade Forms and Stand	2.50
Inlay Carver No. 5	.75
Locking Tweezers "K"	.75
Pipette Bottle	.25
Spatula No. 13	.25
Porcelain ..... per jar	.40

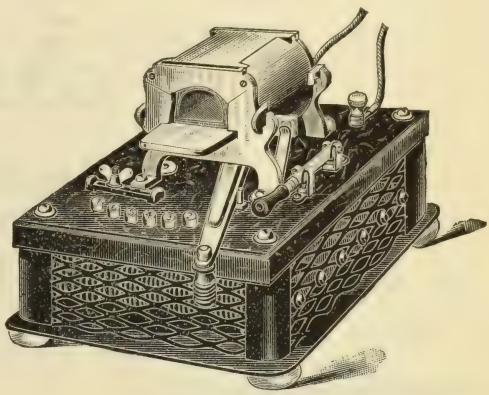
The Hammond Electric Furnaces

Patented December 3, 1901, and February 10, 1903. In Great Britain, November 10, 1902. In Germany, November 11, 1902. In France, February 16, 1903. In Canada, May 12, 1903.

No. 1



No. 2



The printed testimony of expert porcelain-workers, as found in papers prepared solely for the information of their fellow-practitioners, shows that the electric furnace is best for high-fusing porcelains.

The same sort of testimony from other expert porcelain-workers shows that the electric furnace is best for low-fusing porcelains.

The conclusion from these premises is that the electric furnace is best for either high-fusing or low-fusing porcelain, or both.

And a coroliary to this conclusion is that the Hammond Electric Furnace is the furnace for the porcelain-worker.

Any desired heat can be had, from the lowest used in fusing porcelain up to the melting-point of platinum—a range which will fuse any porcelain employed in dentistry. This heat is under perfect control, the furnace is durable and easily operated.

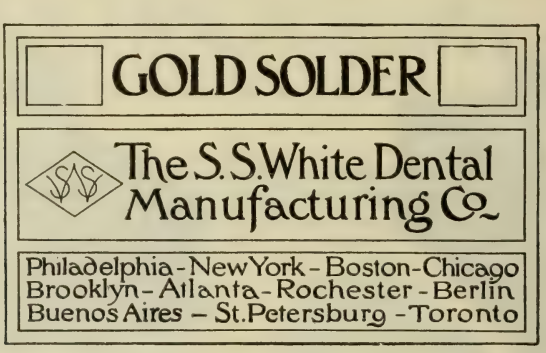
Beginning Porcelain Work

Looking over the list below will show you that introducing Porcelain Work into your practice involves a comparatively small outlay. Remember that this outfit equips you for a good deal of work.

1 Hammond Furnace, No. 2, with Medium Muffle, say 110 volts	$45.00
" Notes on Dental Porcelain." By V. Walter Gilbert, D.D.S.	1.00
1 Set SS Porcelain, A to Z, either High or Medium Fusing, including Outfit as follows: Inlay Carver No. 5, Locking Tweezers "K," Pipette Bottle, Spatula No. 13, and Shade Forms and Stand	12.50
1 Set SS Mineral Stains	5.00
1 Pair Inlay Matrix Pliers No. 60	1.75
3 Duffield's Inlay Matrix Swagers, at $0.50	1.50
1 dwt. Platinum Foil (.001)	1.40
2 Gem Cavity Trimmers, Nos. 2 and 5, at $0.20	.40
2 Arkansas Stone Points, Nos. 1 and 5, at $0.50	1.00
2 Diamond Burs, 1 each Nos. 3 ($0.75) and 11 ($1.25)	2.00
7 LeCron Inlay Burnishers, Nos. 3, 5, 7, 8, 9, 10, 11, at $0.35	2.45
1 Ebony-Handle Lancet No. 4	.60
1 Harvard Quick-Setting Inlay Cement	1.25
1 Box Extra Fine Silex (1 lb.)	.25
	$76.10
Hammond Furnace, No. 1, say 110 volts	$38.00
The same, with outfit as above	69.10

Illustrated descriptive pamphlet for the asking.

GOLD PLATES, GOLD SOLDERS, PLATINUM PLATES, ETC.



CHARACTERISTICS

The characteristics of our Gold Plates and Solders are—

The Plates of any given karat are always the same in color and working qualities, and give the same results under the same manipulation.

The solders run like water, and are so clean that you can see where they are running and what they are doing all the time.

Working a given karat of SS Plate with the corresponding karat of SS Solder, the fusion is perfect, the joint invisible, and the strength of the soldered piece homogeneous.

THE NEEDED QUALITIES SUPPLIED

These three sentences express clearly the reasons why our Plates and Solders are preferred by the thousands of crown-and bridge-workers who are acquainted with them; why every dentist who is not already using them should test them. They have the needed qualities in greater perfection than can be found elsewhere.

THE STANDARD FOR NINETEEN YEARS

Our Plates and Solders were introduced in their present standardized form in 1885, to meet the needs of crown-and bridge-workers. Then, and not till then, the dentists found certainty in the working of plates and solders. The traits which made their introduction an epoch in the construction of crowns and bridges are maintained by painstaking care in every step of their preparation. Purity of metals and exactness of manipulation are the formula for their production.

THE KARAT MARK

The karat mark on our Gold Plates is absolute. It tells the fineness of the Plate truthfully. The variation from the mark is never more than the thousandth part of a karat. The mark of our Gold Solder indicates the karat of the Plate with which it is intended to be used.

Gold Plates sold in any quantity, size, or shape desired; also, in 3, 5, and 10 dwt. lots, as shown by diagrams on opposite page.

Gold Solders sold in envelopes, in any quantity from 1 dwt. up.

For prices see next page

Gold Plates, Gold Solders Platinum Plates, Etc.

WIDTH 5/8"				
GAGE	28	29	30	31

WIDTH 1"				
GAGE	28	29	30	31

WIDTH 1¾"				
GAGE	28	29	30	31

As a possible help in ordering, we show here approximate lengths of 22-K. Gold Plate in widths of 5/8, 1, and 1¾ inches for gages 28, 29, 30, 31, weighing respectively 3, 5, and 10 dwts.

Gold Plates

		RETAIL
24-K	per dwt.	$1.10
Coin	"	1.02
22-K	"	1.05
20 "	"	.97
18 "	"	.87
Clasp	"	1.02
Crown Metal, Gold and Platinum	"	1.20

Gold Solders

For Coin Gold Plate	per dwt.	$0.96
" 22-K "	"	1.00
" 20 " "	"	.95
" 18 " "	"	.85
" 16 " "	"	.75
" 14 " "	"	.65

Platinum Solder

Gold 75 %, Platinum 25 % ..... per dwt. $1.30

Wires, Springs, Etc.

Gold Wire, Round, 18-K	per dwt.	$0.93
" " Half Round, 18-K	"	1.00
" Clasp Wire, alloyed with platinum	"	1.05

Wires, Springs, Etc.

(Continued)

		RETAIL
Gold Ligature Wire	per dwt.	$1.25
" Spiral Springs, 10-K	"	.80
" " " 18-K	"	1.15
" Spring Attachments, 4 in a set, per set, $6.00	each	1.50

Platinum

Plate, Hard or Soft	Prices
Wire, Hard or Soft	fluctuate

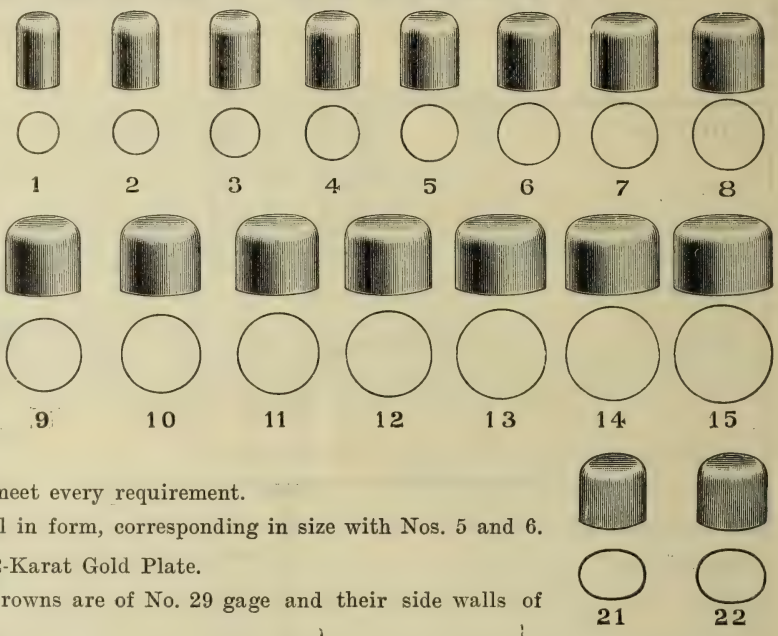
Silver

Clasp	per dwt.	$0.27		
Plate, Coin	per oz. $0.95;	"	.06	
" Pure	" .95;	"	.06	
Solder	" .80;	"	.05	
Springs	each	.25		
Wire, Coin	per oz. $1.60;	per dwt.	.10	

PRECIOUS METALS STRICTLY CASH

Seamless Gold Shells

22-KARAT



These Gold Shells are ready as sold to be swaged and contoured into perfect crowns.

Nos. 1 to 15 are round, ranging in regular gradations from the smallest to the largest size needed. The variations in size are regular, each succeeding number having a diameter .02 of an inch greater than the size next smaller. This variation (two hundredths of an inch) will meet every requirement.

Nos. 21 and 22 are elliptical in form, corresponding in size with Nos. 5 and 6.

These shells are made of 22-Karat Gold Plate.

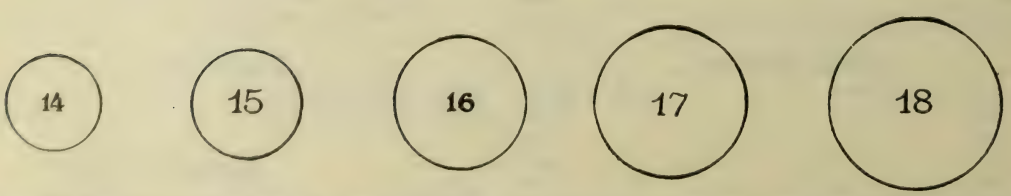
They are seamless. Their crowns are of No. 29 gage and their side walls of No. 30 gage.

Price .....per dwt. $1.07

With each complete set of 17 Seamless Gold Shells sold we give free a wood block for holding them conveniently. It has a separate peg or stud for each shell.

Gold Disks

FOR MAKING SHELLS



Dentists who have outfits for the stamping up of shell crowns will find these disks a convenience. As made they especially suit the Morrison Die-Plates, with sizes 14, 15, 16, 17, 18 to which they correspond. They can also be readily used with most of the other apparatuses in use. The diameters of the Disks are, No. 14, 0.489 inch; No. 15, 0.579 inch; No. 16, 0.676 inch; No. 17, 0.770 inch; No. 18, 0.871 inch.

Made of our standard 22-Karat Gold Plate, 30 gage.

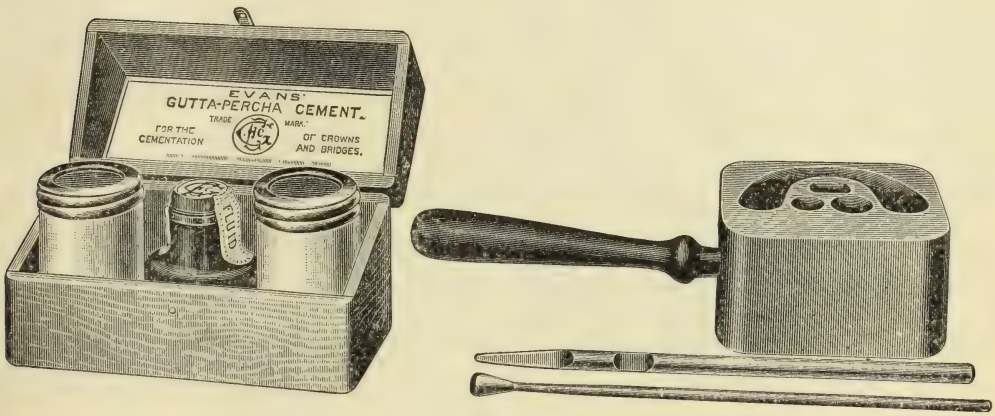
Price .....per dwt. $1.05

Evans' Gutta-Percha Cement

AND

Outfit for Setting Crowns and Bridges

MANUFACTURED BY THE EVANS COMPANY



Dr. Evans' Gutta-Percha Cement is offered as the ideal preparation for setting crowns and bridges in 90 per cent. of the cases which present.

Its manipulation is as easy as that of an oxyphosphate.

It is extremely adhesive,—a crown or bridge set with it stays.

It is insoluble in the fluids of the mouth, there is no disintegration, and naturally no wear.

It acts as an elastic cushion, preventing damage from too severe use.

In case of need for removing the piece, the application of a hot instrument will loosen it.

There are two reasons for the satisfactory work done with this particular preparation of gutta-percha. The first is the perfect adaptation of the cement to its purpose. The second is the manner in which it is worked, and that involves the outfit.

Without going into details, the crown or bridge, the Cement, and the instrument with which the Cement is manipulated are all brought to one heat.

A moment's examination of the outfit will show how practically it does this.

There are two kinds of the Cement, Pink for crowns and bridges, White for either porcelain or open-faced gold crowns. Besides a jar of each, the outfit contains a bottle of Adhesive Fluid and a brush for applying it; a Gutta-Percha Cement Heater, Gutta-Percha Cement Spatula, and a Gutta-Percha Crown Heater, all especially devised and adapted for working the Cement.

Price, Complete Outfit $5.00

OR SEPARATELY

Case of Gutta-Percha Cement, containing one jar each of Pink and White Cement, Bottle of Adhesive Fluid and Brush 3.00

One Jar of Pink or White Cement 1.50

Bottle of Adhesive Fluid ..... .50

Gutta-Percha Cement Heater 1.50

" " Spatula ..... .65

" " Crown Heater ..... .85

Trial Package containing Cement and Adhesive Fluid 1.00

Full instructions accompany the Cement.

This Will Interest You!

We manufacture our own Base-Plate and Veneering Rubbers —for only so can we control every stage of the operation and put our Trade-◈-mark on every package. That is your guaranty.

To make a perfect dental plate rubber three things are necessary. Best materials money can buy, brains, and eternal care and watchfulness. We employ all three. Our rubbers show it.

Let us go a little into detail. The first thing you ask of a dental plate rubber is good packing qualities. When the case is put under the press you want the rubber to flow. How often have you cured a plate only to find the hardness of the rubber had broken down the plaster cast. Time, material, work—all wasted.

We make our rubbers so soft, by an improved process, that it is a delight to work with them. Try it and be convinced.

We could elaborate on all the splendid qualities, but you will find them out for yourself. The toughness, strength, density of our rubbers are unsurpassed. They make plates that will stand abuse.

You are anxious to please your patient. Make a plate of any of our base-plate rubbers; veneer it with one of our pinks. The result will be artistic. Note the delicacy of shade, the fine polish, the clear line of demarkation between the base-plate and the pink veneer. You have got what you are looking for—a perfect plate.

Make a trial of the ◈ Base-Plate and Veneering Rubbers. You will, like Oliver Twist, want "more," because they are **right** in Quality—Weight—Price—Results. Why? They bear the Trade-◈-mark.

PRICES

			5-LB. LOTS	25-LB. LOTS
Bow-Spring	for Base Plate	Per lb., $2.00	Per lb., $1.80	Per lb., $1.70
No. 1, Red, Dark	" " "	" 2.00	" 1.80	" 1.70
No. 2, Red, Light	" " "	" 2.00	" 1.80	" 1.70
Weighted	" " "	" 2.00	" 1.80	" 1.70
Black	" " "	" 2.00	" 1.80	" 1.70
White	for Veneering	" 3.00	" 2.70	" 2.55
Pink	" "	" 3.00	" 2.70	" 2.55
Pink A	" "	" 3.00	" 2.70	" 2.55

PUT UP IN HALF-POUND BOXES

DR. GILBERT WALKER'S

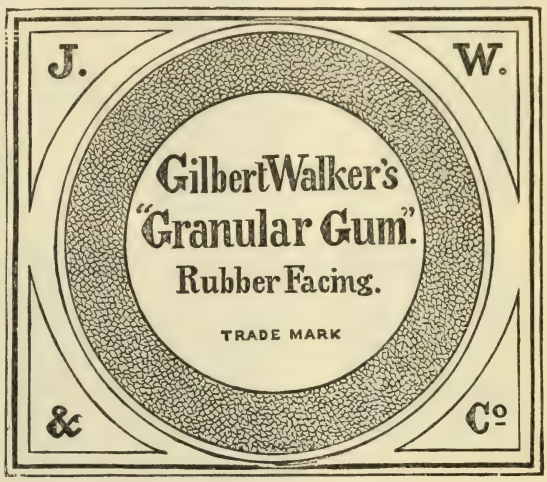
Vulcanizable "Granular Gum" Facing

Patented January 1, 1889

This Facing, which vulcanizes with any dental rubber, approximates closely, when properly finished, the life-like appearance of continuous-gum work. A very thin facing suffices. A variety of colors allows the dentist to either match the natural gum adjacent, or to suit the entire gum to the complexion of the patient.

Wrapped in tin foil and put up in one-ounce envelopes, sufficient for four full sets. Directions for use with each package.

PRICES	Per oz.
No. 1. Mottled Granular Gum	$1.00
" 2. Purple Tint Dark Granular Gum	1.15
" 2A. Purple Tint Light Granular Gum	1.15
" 3. Florid Tint Dark Granular Gum	1.15
" 3A. Florid Tint Light Granular Gum	1.15



The S. S. White Dental Mfg. Co., Sole Agent for the United States

POULSON'S PINK RUBBER

(In ½-lb. boxes)

Price ..... per lb. $5.50

POULSON'S SHADED VENEERING RUBBERS

The idea which led to the introduction of Poulson's Shaded Rubber for Veneering was: that a combination of shades would be more pleasing to the eye and a nearer approach to the appearance of the natural gum than a solid color.

They are furnished in two varieties, as follows:

Shaded Pink Rubber No. 1 Light was devised to supply the defects of monochrome pink rubbers in imitating gum-tissue. It helps to give a natural appearance to the denture.

Shaded Pink Rubber No. 2 Medium produces a somewhat darker gum color than the No. 1. In other respects it is the same. The two shades will cover the range of difference in color of natural gum-tissue very well.

Put up in ⅛-lb. packages.

Price, Shaded Pink Rubber No. 1 or No. 2, either variety ..... per pkg. $1.50

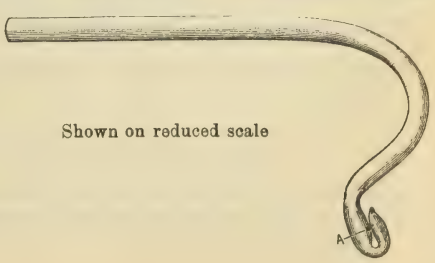
The S. S. White Dental Mfg. Co., Sole Agent for America

IMPROVED GLASS MOUTHPIECE FOR SALIVA EJECTORS

DR. J. SIMONSON'S **Patented June 4, 1895**

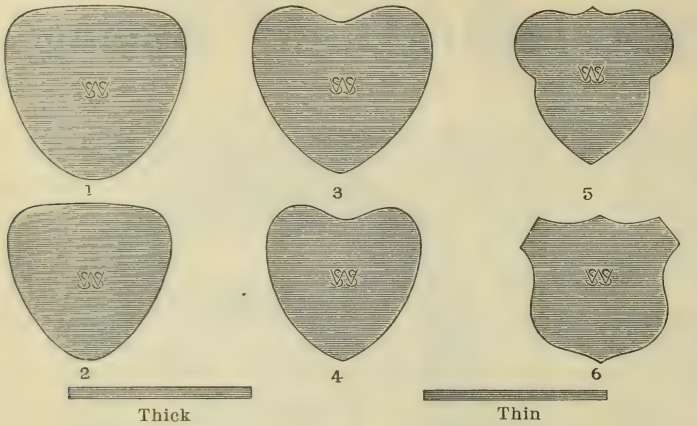
In this very practical device, suggested by Dr. J. Simonson, the orifice at A is protected by turning back over it the end of the tube, so that the mucous membrane of the mouth will not be drawn into it, and it will be less liable to obstruction from any cause. Adapted for use with our Improved Saliva Ejector.

Price ..... per doz. $1.00; each $0.10



Shown on reduced scale

AIR-CHAMBER PATTERNS



Each form of our Air-Chamber Patterns is made in both thicknesses, affording practically a choice of twelve styles. They are put up in boxes containing a dozen each, either of separate numbers or assorted thin or assorted thick.

Price, Thick, . per doz. $0.25
" Thin... " .20

CHAMBER METAL

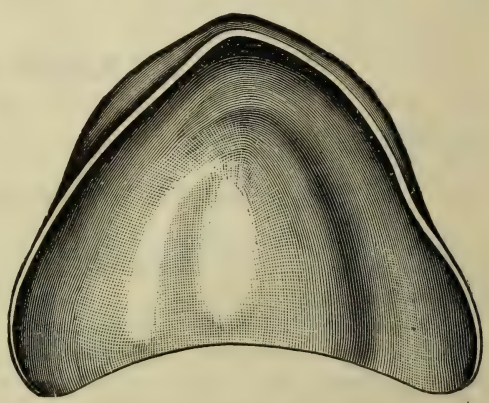
THICK, No. 15, and THIN, No. 17, B. & S. GAGE

Put up in Envelopes containing ½ lb.....per lb. $0.25

THE IDEAL DENTAL BASE-PLATE

Plastic as Wax
Rigid as Metal
Fits like a Glove

Does not "Crawl" from the Cast, nor Soften under the Heat of the Mouth



The Ideal Dental Base-Plate is a fixed compound of a brownish color, which is supplied in thin sheets, about 3¼ x 2½ inches. It is hard and, though not easily broken, is somewhat brittle. Held in boiling water, or over a spirit lamp for a few minutes, it softens, and can then be molded easily and rapidly to fit the most minute inequality of the cast as closely as a vulcanized rubber plate. It hardens in a few minutes and is then only inferior in stiffness to a metal plate of the same thickness, and retains its shape unchangeably. When softened it can be cut with shears; when hard it can be trimmed to any form with a file, even to a feather edge. For trial-plates for taking the bite it is unequaled. It has been—not merely can be, but *has been*—used to mount teeth for actual service in the mouth for a week or so. It does not change its form in the heat of the mouth, but retains its position like a metal plate, neither softening nor pressing out of shape. If broken it is easily repaired, and when repaired is as strong as ever. The Ideal Dental Base-Plate is readily utilized for making an emergency impression tray, with a handle, by forming it over a plaster cast of similar shape to the case in hand, but larger in size.

Put up in boxes containing 12 sheets.
Price .....per box $0.50

NERVE PASTE

A proper combination of arsenous acid and creasote that has proved to be a standard application to pulps when they are condemned to devitalization. Does its work promptly and with the least pain.
Price .....per bottle $0.50

Scientific Suction for Vulcanite Dentures

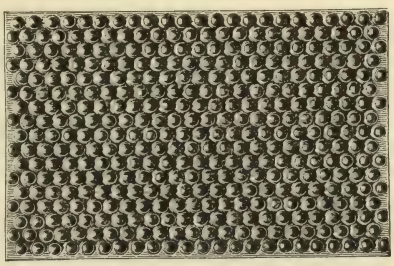
The ideal scientific suction in vulcanite dentures is obtained by making a perfect fit. If the fit is perfect, the suction will be ideal. But every prosthetic dentist knows the difficulties of obtaining this perfect fit. A slight drawing of the plaster over an irregularity, a bulging because of soft tissues, or even at times the slight expansion of the plaster itself in setting, will ruin the fit.

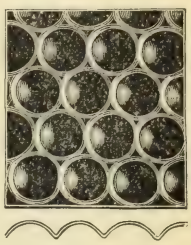
The usual remedy—the air-chamber—has objections in that it causes irritation through the sharp edges and decided offsets in the soft tissues which it forms, in some cases progressing to paralyzation of the parts.

Many devices have been proposed to avoid this, two of the most approved of which we present below, the Aluminum Suction Plate and the Cohesion Surface Form.

In both of these the idea is the division of the suction area into numerous small spaces, which may be distributed as desired over the denture instead of confining it to a single large space in the central portion. Plates so made adhere as if glued to the parts, without causing irritation or marked indentations of the mucous surface.

ALUMINUM SUCTION PLATES





The Aluminum Suction Plate is made of thin Aluminum, embossed in such way that one side presents the appearance of a series of minute cup-like depressions, the other of corresponding papilliform prominences. The edges of the depressions are rounded, and their reproduction on the vulcanite provides a series of small suction points or spaces, each a perfect vacuum chamber, and which in the aggregate provide a holding power at least equal to that of the air-chamber without its disadvantages. The metal is sufficiently rigid to prevent the flattening of the cups under the pressure of vulcanizing. Used as a lining for the denture or merely a die upon which to mold its contact surface. In the former case it is attached permanently in the vulcanizing; in the latter, it is stripped off after the conclusion of that process.

Sold in oblong sheets, $1\frac{1}{4} \times 1\frac{7}{8}$ inches; it may be cut into pieces as desired and distributed at advantageous points.

Put up in boxes of six sheets, each box containing full directions for use.

Price .....each $0.05
" .....per box of six .25

COHESION-SURFACE FORMS

Fig. 1

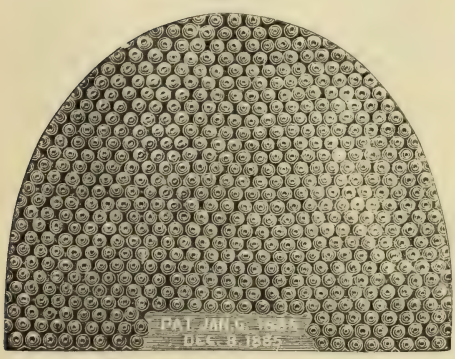
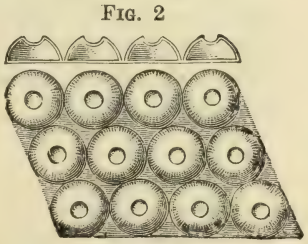


Fig. 2



The Cohesion-Surface Form is of the same general character of embossing as the Aluminum Suction Plate, except that it is made of pure tin and as sold is of a form to be at once fitted to the model. The little cups, also, are concaved at the base, giving them the shape shown in the enlarged sectional view. This Form can also be cut to suit the requirements of the case. Strong adhesion can be had with a narrow plate and thus the sense of taste be left unimpaired. Lower plates made with this device are very firm.

Can be permanently attached to the vulcanite as a lining or used merely as a die to mold the surface. When used as a lining it is fixed to the plate before vulcanizing with rubber cement.

Put up in packages containing one dozen Forms of the size shown, which can be cut for either upper or lower plates.

Full directions with each package.

Price, Cohesion-Surface Forms.....per box $0.25

LIQUID RUBBER CEMENT

Will be found necessary to the proper manipulation of Spyer's Cohesion Forms. The surface of the model on which the form is to be placed must first be coated with the cement.

Price, Rubber Cement.....per bottle $0.25

PYROZONE (H_2O_2)

Antiseptic, Germicide, Bleaching Agent

The main reason for the constantly growing popularity of the Pyrozone preparations is that they are H_2O_2, all the time. The dentist who takes one of these preparations for his hydrogen peroxid is sure that he has always hydrogen peroxid, as they are stable solutions of the drug. Two forms.

MEDICINAL SOLUTION OF PYROZONE

3 per cent. H_2O_2 Aqueous

Wherever a cleansing mouth-wash is required, as in abscess and pyorrhea, Medicinal Pyrozone is the indication. As an antiseptic in all infectious conditions of the oral mucous membrane it produces remarkable results. No risk of toxic effects. Put up in 4-oz. glass-stoppered bottles.

Price, Medicinal Pyrozone.....per bottle $0.50
" " " ..... " doz. 4.50

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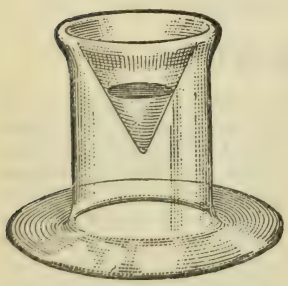
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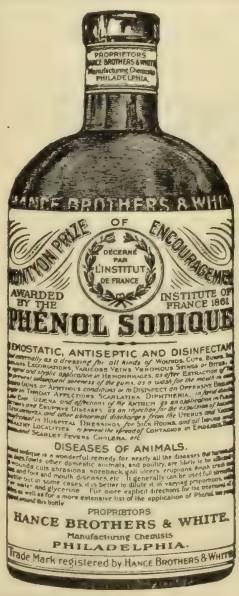
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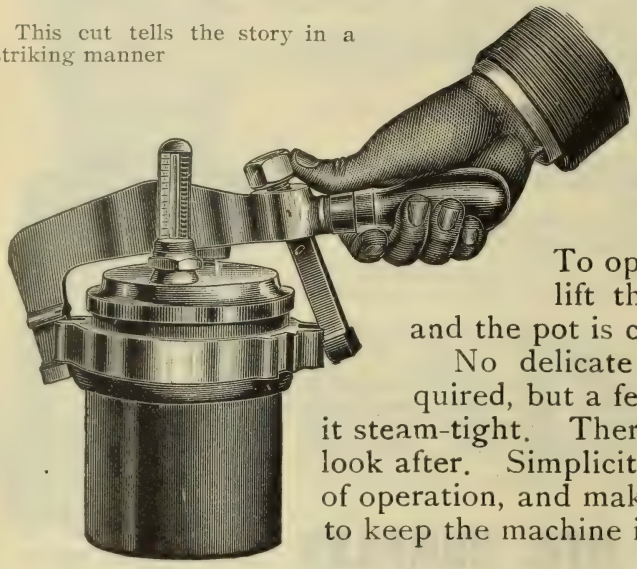
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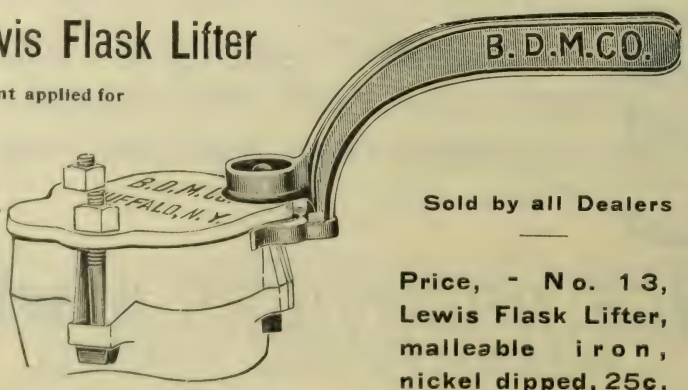
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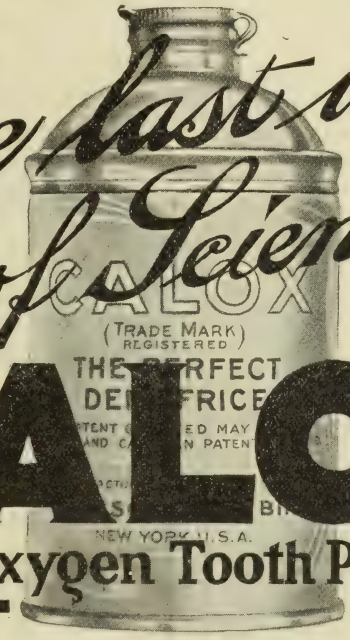
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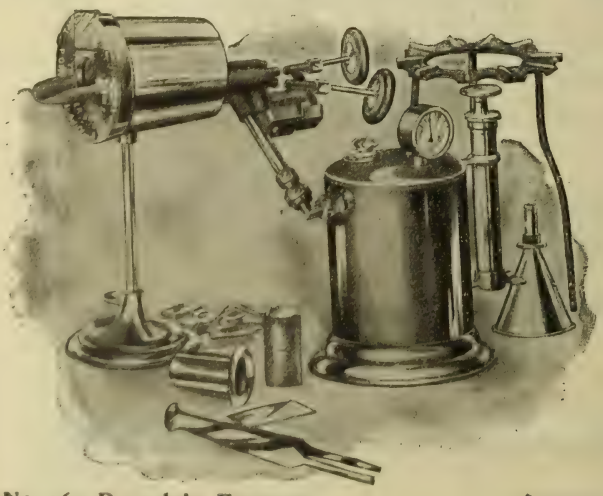
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CAN BE BAKED IN

The Turner Gasoline Porcelain Furnace



No. 160 Porcelain Furnace, . . . $35.00

Other Styles, $21.00 to $30.00

RECENT TESTS

Demonstrate the fact that the latest popular high-fusing porcelains requiring 2624 degrees of heat can be fused better and quicker in the Turner Furnace than any other. The reason is that the Turner Porcelain Furnaces produce all the heat that is required which is even and perfectly controlled. Lower temperatures suited to low-fusing porcelains are secured by an adjustment of the valves.

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We find the truth pays pretty well in all business affairs.

Just so long as we go ahead making the Double Bowl Clark Spittoon ***better than all the rest—***

Just so long will our business continue to grow, as it has been.

During this year so far, we have sold more Double Bowl Clarks than we sold during nine months of last year.

We have during this year shipped Double Bowl Clark Spittoons to almost every country on earth.

We don't know a man on earth that has one that is ***not glad of it,*** and there is a ***reason for it.***

We manufacture this spittoon just as carefully as you put in a gold filling.

He ***might*** take it!!

That does not go around our store.

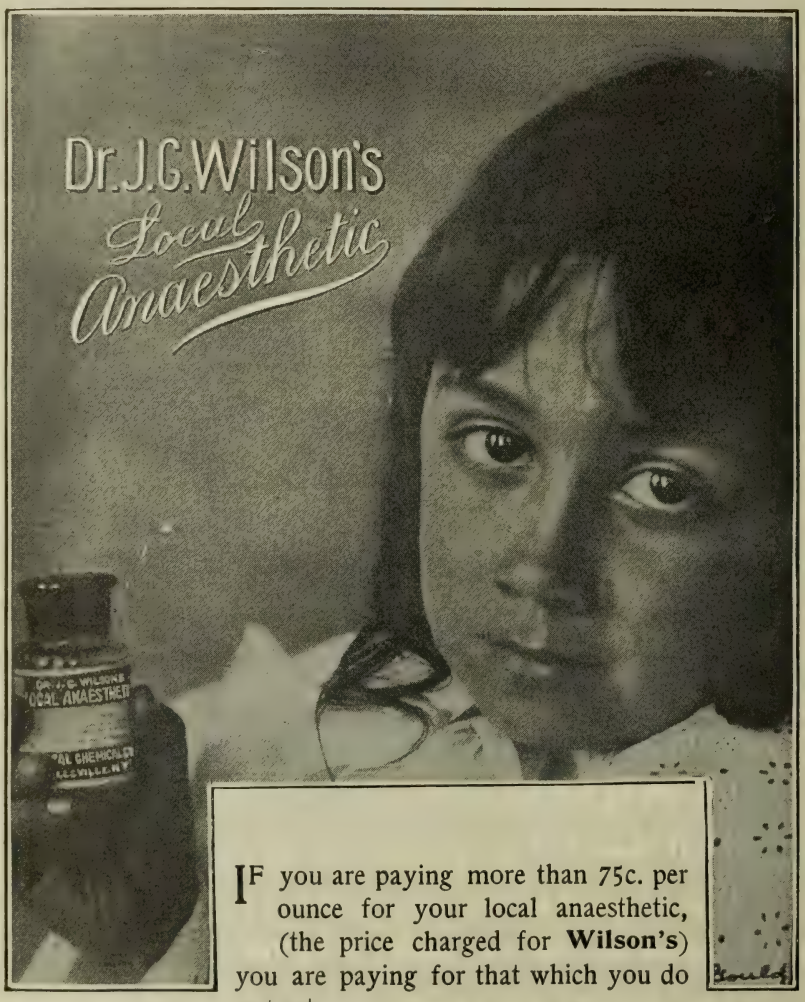
Is it as good as we can make it? If so, send it out, because no one can make it better.

The dentists are rapidly learning that cheap goods are cheap only in name. The ***word "cheap"*** should be left out of every dentist's dictionary, because it is a step backward for the dentist to buy ***cheap things.***

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The Clark Double Bowl costs $65.00, because it is worth it. There is no other logical reason.

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allays inflammation in skin and mucous surfaces and cools, soothes, nourishes and heals.
It is a combination of analgesic, anodyne and antiseptic constituents with

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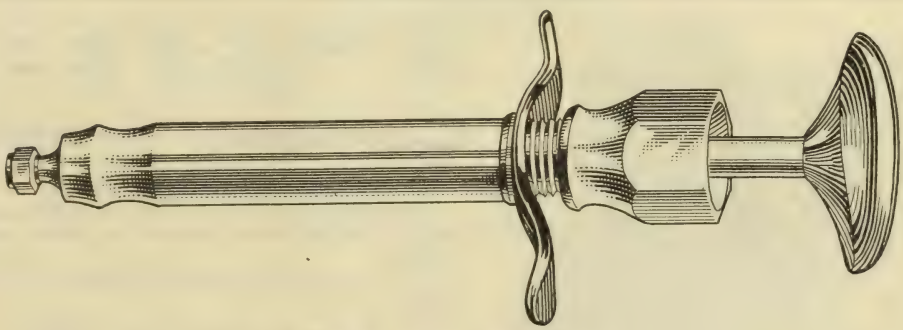
and may be applied with maximum advantage *anytime* and *anywhere*

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is indicated, its marked sedative and healing properties being specially notable in all affections of the skin and mucous surfaces - or membranes - accessible to topical applications.

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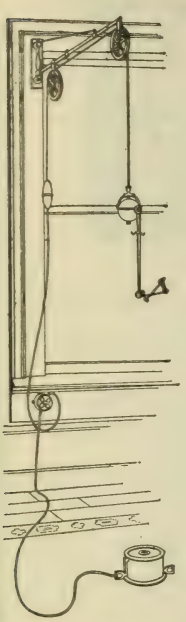
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We have adapted our famous suspended type Columbia Electric Dental Engine so as to operate the Doriot or any other All-Cord Handpiece.

The Cord-driven handpieces are now recognized as the ideal means of transmitting power to the bur. They entirely avoid that unsteadiness of motion or so-called back lash common to all flexible, cable-driven handpieces. It is well known that this steadiness of motion lessens the pain, and patients will often speak of it.

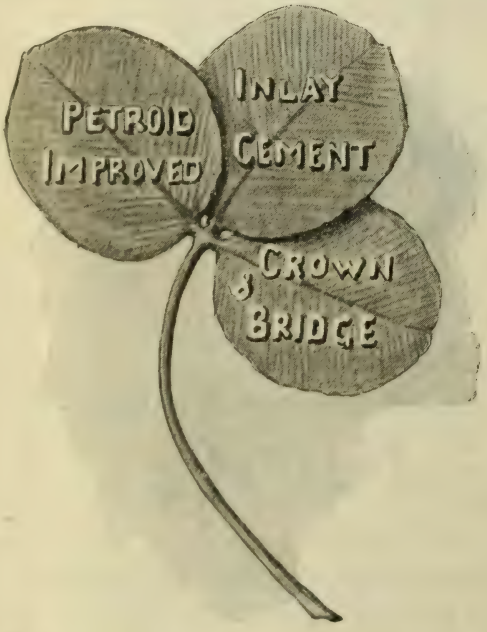
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We cannot pay for space and tell less than the truth.

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If a pulp is exposed and inflamed it probably requires nothing but protection. Good practice demands that you

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CAP THE PULP and

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CAULK'S PULP PRESERVER and NERVE CAPPER brings instant and permanent relief, makes a strong, insoluble bridge and allows you to fill the tooth immediately with any permanent material.

PER PACKAGE $1.50

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No more falling plates. No sneezing plates down. No more coughing or laughing them down. All plates stick up tight. The soft lip does it.

The ease and simplicity of inserting the soft suction rubber recommends it to the dentist. Possibly three minutes more time than the old way.

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Apply hot upon the outside of the face and cover with absorbent cotton. The pain will be promptly relieved, and the inflammation will generally subside without suppuration.

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Price $1.00 per dozen

Assorted or separate sizes

All Dealers keep them



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THREE SIZES

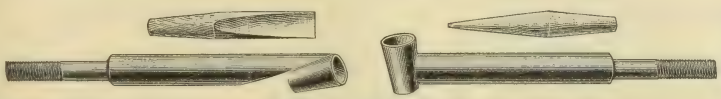
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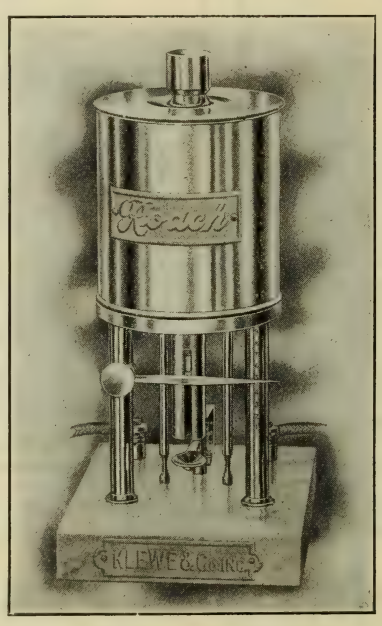
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Fuses all Porcelains uniformly
Requires no attention while in action
Cuts off current automatically, at fusing-point
Produces same shade, regardless of bulk
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Prevents under or over-baking and porosity
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Watching the process of melting is absolutely unnecessary

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Closed during month of September

A permanent school for Post-Graduate work in removable and fixed Crown and Bridge practice.

A thorough training in the technique of Preparation of supports and abutments, the most important part of this work, is assured. The practical application of porcelain to Crown and Bridge work will also form a prominent feature of the course.

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DETROIT COLLEGE OF MEDICINE

Department of Dental Surgery

DETROIT, MICHIGAN

Member of National Association of Dental Faculties, and recognized by the National Board of Dental Examiners

ESTABLISHED 1891

THE FIFTEENTH ANNUAL SESSION will begin September 20, 1905, and continue nine months.

THREE FULL COURSES OF STUDY of nine months each are required for graduation.

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A perpetual ticket (not transferable), good for three or more courses, will be issued for $150.00

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UNIVERSITY OF CALIFORNIA

Dental Department

PARNASSUS AVENUE, SAN FRANCISCO

THE Twenty-fourth Session will commence Monday, September 11, 1905, and close May 31, 1906. No student can be admitted after September 21, 1905.

The final examination for admission will be held September 21 and 22, 1905.

The *requirements for admission* are four years of High School work, including one year's study of Latin.

High School diploma, or certificate covering this amount of work, will be accepted in lieu of an examination.

This College subscribes fully to requirements of the N. A. D. F.

For further information, application blanks, or an announcement, apply to

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Students of Dentistry

cannot do better than attend it.

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DEPARTMENT OF DENTAL SURGERY

UNIVERSITY OF INDIANAPOLIS

The Twenty-Seventh Annual Session begins October 3, 1905

This space will not permit us to tell you much about it, but a postal card inquiry will result in your receiving full information.

Address the College, 131 EAST OHIO ST., INDIANAPOLIS, IND.

Baltimore Medical College Dental Department

A THREE-YEAR COURSE

A perfectly equipped dental college

Large and varied clinic, affording our students an abundance of practical experience

Full corps of Lecturers and demonstrators which enables us to give personal attention to each student

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L. D. ARCHINARD, D.D.S., *Treasurer*, Professor of Dental Pathology, Therapeutics, and Materia Medica.

SAM'L R. OLLIPHANT, M.D., Professor of Chemistry and Metallurgy.

C. VICTOR VIGNES, D.D.S., *Secretary*, Professor of Prosthetic Dentistry and Crown and Bridge Work.

E. DENEGRE MARTIN, M.D., Professor of General and Oral Surgery.

MILTON R. FISHER, D.D.S., Professor of Dental Anatomy and Operative Dentistry.

EDWARD L. McGEHEE, SR., B.S., M.D., Professor of Physiology, Pathology, and Hygiene.

JOHN J. ARCHINARD, A.M., M.D., Professor of Bacteriology, Histology, and Pathological Anatomy.

MARION H. McGUIRE, M.D., Professor of Anatomy.

W. O. TALBOT, D.D.S., Professor of Orthodontia.

The College is now occupying its new building, No. 831 Carondelet Street.
The next session opens November 7, 1905, and will continue seven months.
NEW ORLEANS, the metropolis of the South, offers unlimited clinical material, complete educational facilities, a delightful winter climate, convenient bicycle routes, inexpensive recreations, its world-famous Mardi Gras celebrations, and board as low as $3.00 per week. Collateral medical branches are fully illustrated in clinics and laboratories.

Dentistry is taught by Lectures, Demonstrations, and Infirmary Practice

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University College of Medicine

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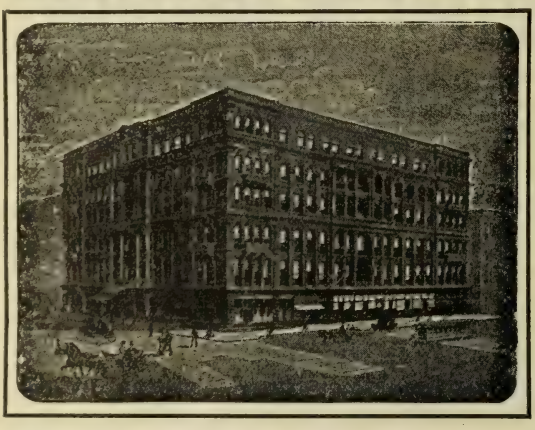
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IDEAL LOCATION.—Situated within the Elevated Railroad Loop. Contiguous to every line of transportation. Accessible to a population of over three millions of people living within a radius of forty miles. This insures an abundance of clinical material of every kind and character.

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ADDED LABORATORIES.—The University has provided a laboratory devoted to porcelain inlay, crown and bridge work, and offers special facilities to students who desire to obtain particular excellence and skill in this class of prosthetics.

The School has been enlarged in all its departments to meet the increasing demands, and no expense has been spared to make it the best in every particular.

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...DENTAL DEPARTMENT...

School of Medicine, Washington, D. C.

Beginning with the sessions of 1904 and 1905, the Course will be THREE YEARS. This School being a member of the National Association of Dental Faculties, conforms to the action of the Association at a special called meeting held in St. Louis, July 18, 1904, changing the course from four years of six months to three years of thirty weeks each.

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OF PHILADELPHIA

DEPARTMENT OF DENTISTRY

The Fees for this Department Have Not Been Raised for the Session of 1905-06

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Omaha Nebraska

THIS COLLEGE was built, elaborately equipped, and endowed for the specific purpose of dental education.

The most modern dental chairs and fountain cuspidors, with gas, compressed air, and electricity, for the use of each operator at the chair and in all technique laboratories, insure the student the opportunity of using the latest and up-to-date appliances.

The Faculty consists of the best teachers to be had in the dental and medical professions.

Winter session begins October 2d and closes the latter part of May.

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A WINTER COURSE IN JUNE WEATHER

COLLEGE OF DENTISTRY OF THE UNIVERSITY OF SOUTHERN CALIFORNIA

This College has erected a New Building, which it will occupy at the beginning of the session 1905-1906. The arrangement of the rooms is ideal, and the equipment new and complete in every department.

At each operating chair will be a fountain cuspidor, electricity, gas and compressed air. The infirmary clinic is greatly in excess of the number of students, and is not interfered with by the weather. The ideal conditions here exist for study, health and pleasure. The teaching facilities are unexcelled, and are taught in a graded, systematic manner, so that each student receives individual, as well as class instruction.

This College is a member of the National Association of Dental Faculties, and is recognized by the National Association of Dental Examiners.

Session 1905-1906 begins Oct. 2d, 1905. For catalogues or other information, address

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CHARTERED 1893

A School of Dentistry
By Dentists for Dentists

THIS INSTITUTION, SINCE ITS ORGANIZATION IN 1893, HAS TRAINED HUNDREDS OF YOUNG MEN FOR THE PRACTICE OF DENTISTRY. THE COLLEGE IS EQUIPPED THROUGHOUT WITH THE NECESSARY APPARATUS FOR TEACHING AND PERFORMING PRACTICAL WORK, THE NEW BUILDING, LOCATED CLOSE IN, IS SURROUNDED WITH GOOD HOMES FOR STUDENTS. ALL DEPARTMENTS ARE CONDUCTED IN ONE AND THE SAME BUILDING, AND ARE PRESIDED OVER BY TEN EXPERIENCED TEACHERS. A COMPLETE GRADUATE COURSE MAY NOW BE TAKEN IN THREE YEARS.

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SESSION 1905-1906 BEGINS OCTOBER 3, 1905

The curriculum comprises a three years' course of thorough instruction in all forms of Modern Dentistry.

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FORMERLY THE

Boston Dental College

BOSTON, MASS.

This School, established in 1868, and with continuous sessions since, is the largest Dental College in New England.

Next session begins on Wednesday, September 26, 1906, and continues until the last Wednesday in May, with the usual vacations at Thanksgiving, Christmas and Easter.

FEES:

Matriculation fee $5.00, Tuition fee $150.00, to all students entering during or after the session of 1906-7.

Entrance examinations, with certain exceptions, required.

In accordance with the rules of the National Association of Dental Faculties, of which this School is a member, students must register before October 6, 1906.

For Catalogue, or further information, address

FREDERICK M. BRIGGS, M.D., Secretary

Pennsylvania College of Dental Surgery

ELEVENTH AND CLINTON STREETS, PHILADELPHIA

FOUNDED 1856

The fiftieth annual session will begin October 3, 1905.

The course of instruction covers three years of eight months in each year and is thorough, progressive, and practical. By lectures, demonstrations, laboratory experimentation, and continuous clinical practice, the student is fitted on graduation to enter at once on active professional work. Frequent quiz and review examinations are held throughout each session by the Faculty.

The College building has a complete modern equipment, and is located in one of the most quiet and refined residential districts in central Philadelphia.

Since its foundation over 2700 graduates have received the diploma of the school, the list of alumni being larger than that of any other dental college in the world.

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DENTAL DEPARTMENT FOUNDED 1886

FOURTEENTH AND ARAPAHOE STREETS, DENVER

THE NINETEENTH ANNUAL SESSION will begin October 3d, 1905.

The requirement for entrance is a certificate of two years' completed high-school work, or its equivalent.

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1905-1906

40th COLLEGIATE YEAR

Infirmary Course
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Lecture Session
October 2d, 1905, to June 4th, 1906 (Obligatory)

For admission, preliminary educational, curriculum and other requirements write for an announcement, addressing

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205-207 East 23d Street, New York, N. Y.

UNIVERSITY OF MARYLAND
DENTAL DEPARTMENT

THE regular Winter Session commences on October 1st of each year and ends in the following May.

The Annual Catalogue contains Courses of Study, etc. Attendance upon three regular winter sessions will be required before the final examinations for the degree of Doctor of Dental Surgery. Any candidate who may fail to pass the final examinations in April will have the privilege of a second examination in the following October without further attendance at a regular session. Graduates of medicine and those who have attended a recognized dental school for one or more sessions are admitted to higher grades on entering this school. The requirements for admission are the same as in all reputable dental colleges, and according to the rules of the National Association of Dental Faculties.

Matriculation fee, $5; Tuition for each session, $100; Graduation fee, $30; Dissecting fee, $10.

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Candidates for admission are required to present evidence of a preliminary education as follows:

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FEES

Matriculation Fee (paid once only)	$5.00
Fee for One Course of Lectures	150.00
Dissecting Fee—First and Second Year, each	6.50

NOTICE.—Beginning with the session 1905-1906 the tuition fee for all new matriculates will be $150 for each year of the course; and the present diploma fee of $30 will be abolished in the case of all who come under this condition.

Board can be obtained at from five to eight dollars per week, according to location and accommodations

The Dental Department is located in "Dental Hall," the new building especially erected for its use. The facilities thus afforded are, it is believed, unequaled for securing an education complete in all departments of dental science and art. The clinical operating room is 180 by 50 feet, lighted on all sides, and furnished with 100 Wilkerson Chairs of latest pattern, especially constructed for the Department. Each operating chair has a fountain spittoon attached, also especially designed and constructed for this Department. Electrical service is supplied to all chairs, and is of a character to cover all of the applications of electricity to dentistry. The Prosthetic Department is supplied with laboratory facilities devoted to every branch of the work. Prosthetic technic, in vulcanite and metal work, porcelain work, continuous-gum work, and crown and bridge work, is taught by modern methods in separate laboratories especially equipped for the pur-

University of Pennsylvania DEPARTMENT OF DENTISTRY

pose. The laboratories are furnished with power lathes and with compressed-air apparatus for soldering and metallurgical operations.

The clinical patronage of the Department is always in excess of the needs of the students.

Oral surgical clinics, also general surgical clinics, are held twice a week.

Practical instruction in Chemistry, Metallurgy, Histology, Physiology, and Bacteriology is given in appropriately equipped laboratories.

The Dissecting-Room is large, well-lighted, thoroughly ventilated, and is furnished with ample material for the successful prosecution of anatomical studies.

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All of the departments of practical laboratory and clinical instruction are in charge of competent and experienced demonstrators, who are ably assisted in the work of instruction by a full corps of expert assistants.

The Dental Department of the University is an integral part of the University system. Its students at the discretion of the Dean are permitted to take courses of instruction in other departments of the University without additional fees, and are eligible to and participate in all those features of University life common to the whole student body of the institution. These include its athletic features and privileges of the Howard Houston Hall, the club house of an organization governed by the University students and having all of the appointments and desirable features of a strictly first-class club. The dormitories of the University are the best of their kind in this country, and to these the students of dentistry are admitted in common with the students of all the other departments.

THE ANNUAL SESSION

The session begins the last Friday in September, and ends at Commencement, the third Wednesday in June. (No student admitted to the regular course after October 10th.) The number of lectures per week, with a synopsis of the various branches taught, will be found in the General Catalogue.

The course of instruction will extend over a period of THREE YEARS.

In order to facilitate work in the practical branches, and to economize the student's time, the regular session is so arranged that students during the first year are required to devote the time equally to DENTAL, HISTOLOGICAL, AND CHEMICAL LABORATORY WORK. During the second and third years the student has practically the entire forenoon of each day for dental work. Thus ample opportunity is afforded for practice in OPERATIVE AND MECHANICAL DENTISTRY. In the latter branches the students of the first year are divided into sections, devoting the time not otherwise engaged to practice in the operating rooms.

PLAN OF EXAMINATION

The gradation of the course enables the First-year student to present himself for examination in the following branches: CHEMISTRY, MATERIA MEDICA, HISTOLOGY, and ANATOMY, including OSTEOLOGY, MYOLOGY, OPERATIVE AND PROSTHETIC TECHNICS. The second-year student will be examined in MATERIA MEDICA, BACTERIOLOGY, APPLIED ANATOMY, and PHYSIOLOGY, and on the progress in OPERATIVE AND MECHANICAL DENTISTRY. Such an arrangement is economical not only in point of time, but also in facilitating a student's acquirement of knowledge in the remaining branches.

The final examination at the close of the third year is in OPERATIVE DENTISTRY, MECHANICAL DENTISTRY, METALLURGY, CLINICAL DENTISTRY, DENTAL PATHOLOGY, AND THERAPEUTICS, AND ORAL SURGERY.

All applicants for advanced standing must pass the required examination of this school, or furnish proof that they have passed EQUIVALENT examinations in some recognized dental or medical school. Graduates of a recognized medical college will be admitted to the second-year class without examination.

For detailed information and announcements, address

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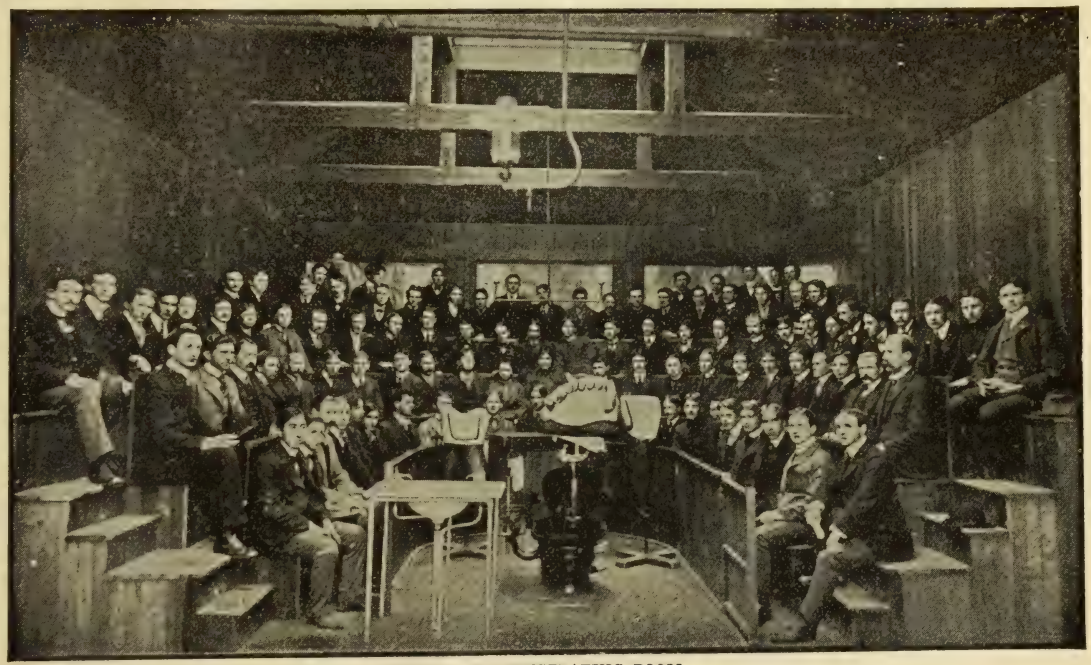
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The fact that dentistry must be practically taught is fully recognized, the College Infirmary, a most complete, large and handsome hall, being daily filled with clean and respectable patients, of a class nearly equal to those of the average dentist. The Infirmary is open all the year. For Summer Session, no charge to those who attend the following Winter Session.

The session begins October 1. A large corps of demonstrators, always present, put in actual practice the teachings of all lectures in dentistry, leaving nothing undemonstrated. All methods are fully taught, all appliances and apparatus used; the making of instruments and the most elaborate gold and continuous-gum work, and all the cases arising in ordinary practice, with many which are rarely seen, carefully demonstrated.

Commencing October 1, 1895, women will be admitted to this College, subject to the same requirements as men.

The College has formed an alliance with the College of Physicians and Surgeons by which its students are privileged to attend all lectures and clinics. The patients of this medical school numbered last year over 40,000.

The qualifications for entering the first years' course are in accordance with the resolutions adopted by the National Association of Dental Faculties.

TERMS OF GRADUATION.—Attendance on three winter courses of lectures in this College; as equivalent to one of these we accept one course in any reputable dental college. Graduates in Medicine can enter the Junior Class.

FEES.—Matriculation (paid once only), $5.00. Tuition fee, $100.00. Diploma fee, $30.00. Dissecting fee, $10.00.

Students corresponding with the Dean will please be careful to give full address, and direct their letters to

M. W. FOSTER, M.D., D.D.S., Dean, No. 9 W. Franklin St., Baltimore, Md.